Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, June 9, 1928 (Issued Every Other Week) Volume XXXI, No. 12

MEMBER A. B. C. *The Only Paid Circulation covering the Rock Products Industry* MEMBER A. B. P.

Printing of This Issue Is 5450 Copies. Next Issue Will Be June 23

Safety Margin

-50%

Capacities of all cranes must be calculated on *some* safety margin!

Koehring capacities are based on *50% safety factor of stability* as against the usual 33-1/3%.

Koehring ratings are based on 66-2/3% of the overturning load, as contrasted with the ordinary ratings of 75% of overturning load!

That's your positive assurance that Koehring rated capacities are actual working capacities with margin to spare!

Again we say "*Know* the Koehring!"

Write for Crane Bulletin No. CR-29.

Crane Capacities

Based on 66⅔% of Overturning Load

Quickly convertible to shovel or dragline.

No. 301—10 Tons at 12' Radius; 1 Yd. Clamshell Bucket at 28' Radius, 40' Boom; ¾ Yd. Clamshell Bucket at 34' Radius, 45' Boom; ½ Yd. Clamshell Bucket at 41' Radius, 50' Boom.

Wisconsin four cylinder gasoline engine, 5¼" x 6½", 1,000 R. P. M.

No. 501—17 Tons at 12' Radius; 1½ Yd. Clamshell Bucket at 31' Radius, 45' Boom; 1¼ Yd. Clamshell Bucket at 36' Radius, 45' Boom; 1 Yd. Clamshell Bucket at 41' Radius, 50' Boom; ¾ Yd. Clamshell Bucket at 48' Radius, 55' Boom.

Wisconsin four cylinder gasoline engine, 6" x 7", 925 R. P. M.

A 4711-I

KOEHRING COMPANY MILWAUKEE, WISCONSIN

PAVERS, MIXERS—GASOLINE SHOVELS, CRANES AND DRAGLINES

Sales Offices and Service Warehouses in all principal cities

Foreign Department, Room 579, 50 Church Street, New York City

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KOEHRING HEAVY DUTY

ROTEX

No Other Screen Has These Valuable Features!

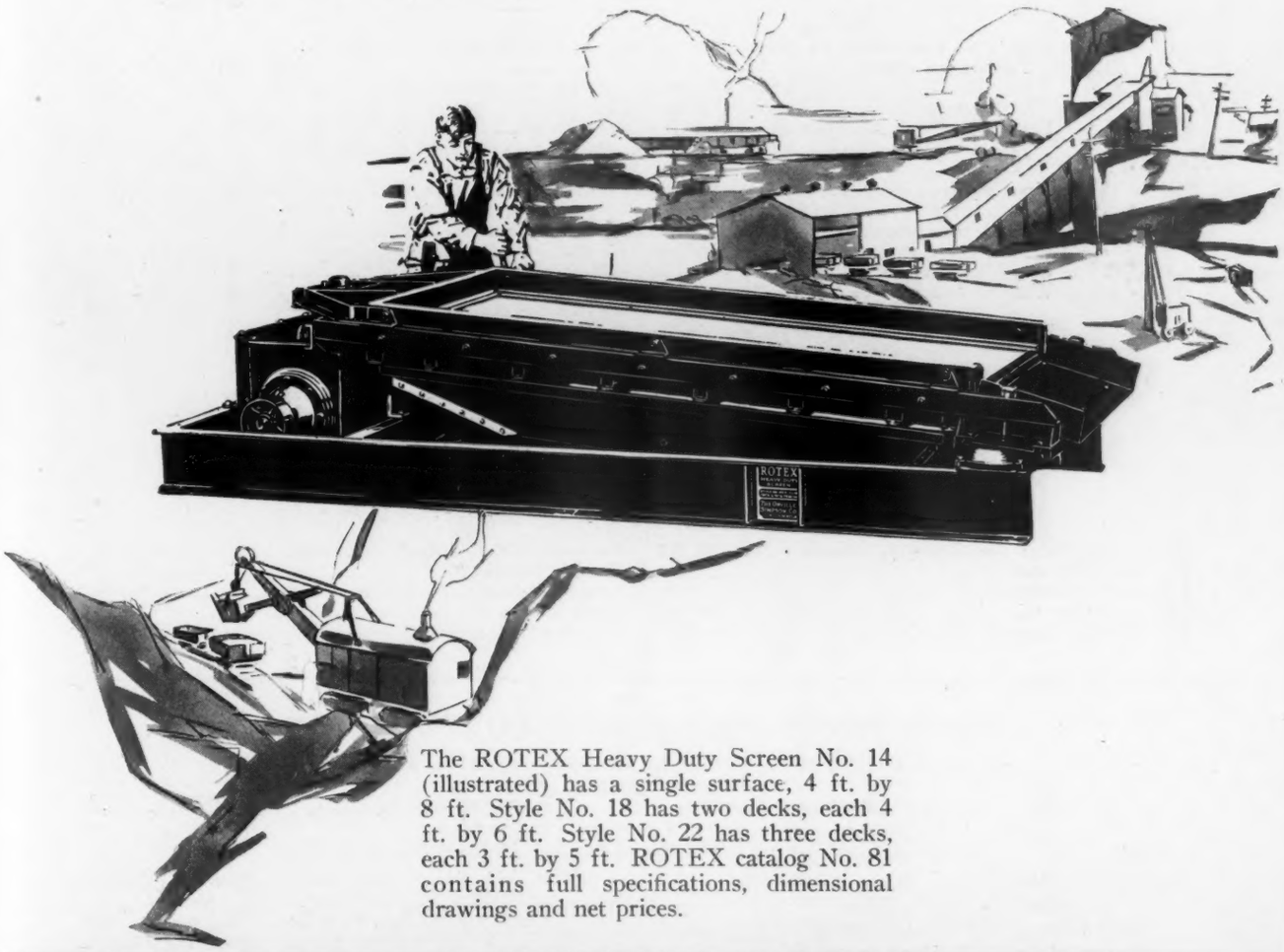
. . . 50 large, solid, live rubber balls, which strike the under side of the screen and dislodge material from between the meshes by direct pounding contact.

. . . a nearly level screen surface on which the material is slid rapidly forward by means of a level, circular motion.

. . . a motion which spreads and stratifies the material, causing the finer particles to sink down against the meshes.

. . . a rapid and accurate separation—the result of combining the Rotex patented mesh cleaning system with the level, circular screen motion.

. . . a large screen of very low head room, waterproof, dust-proof, and as well adapted to sprays, or dewatering, as to dry screening.



The ROTEX Heavy Duty Screen No. 14 (illustrated) has a single surface, 4 ft. by 8 ft. Style No. 18 has two decks, each 4 ft. by 6 ft. Style No. 22 has three decks, each 3 ft. by 5 ft. ROTEX catalog No. 81 contains full specifications, dimensional drawings and net prices.

The ORVILLE SIMPSON COMPANY
Office and Factory
1221 KNOWLTON ST. CINCINNATI. OHIO

The Only Paid Circulation Covering the Rock Products Industry

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

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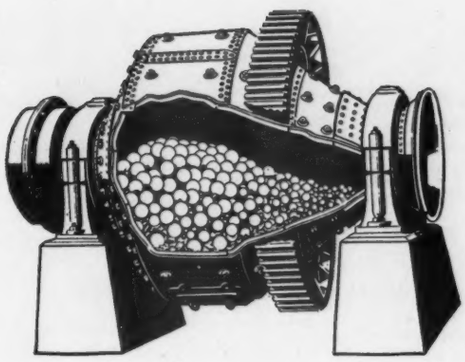

Grinding Grog

Following is an excerpt from a report on the operation of a Hardinge Conical Mill Grinding Grog.

"The mill is doing excellent work. From a 2" ring feed, they get 4½ tons per hour of the following product:

On 10 mesh	2.75
On 20 mesh	23.50
On 48 mesh	32.00
On 100 mesh	14.50
Thru 100 mesh	27.25

"The product is just what is wanted and particles, contrary to expectations, are angular."

Send us your grinding problem

HARDINGE COMPANY
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Ruggles-Coles Dryers, Conical Ball. Pebble and Rod Mills, Thickeners, Clarifiers

HARDINGE

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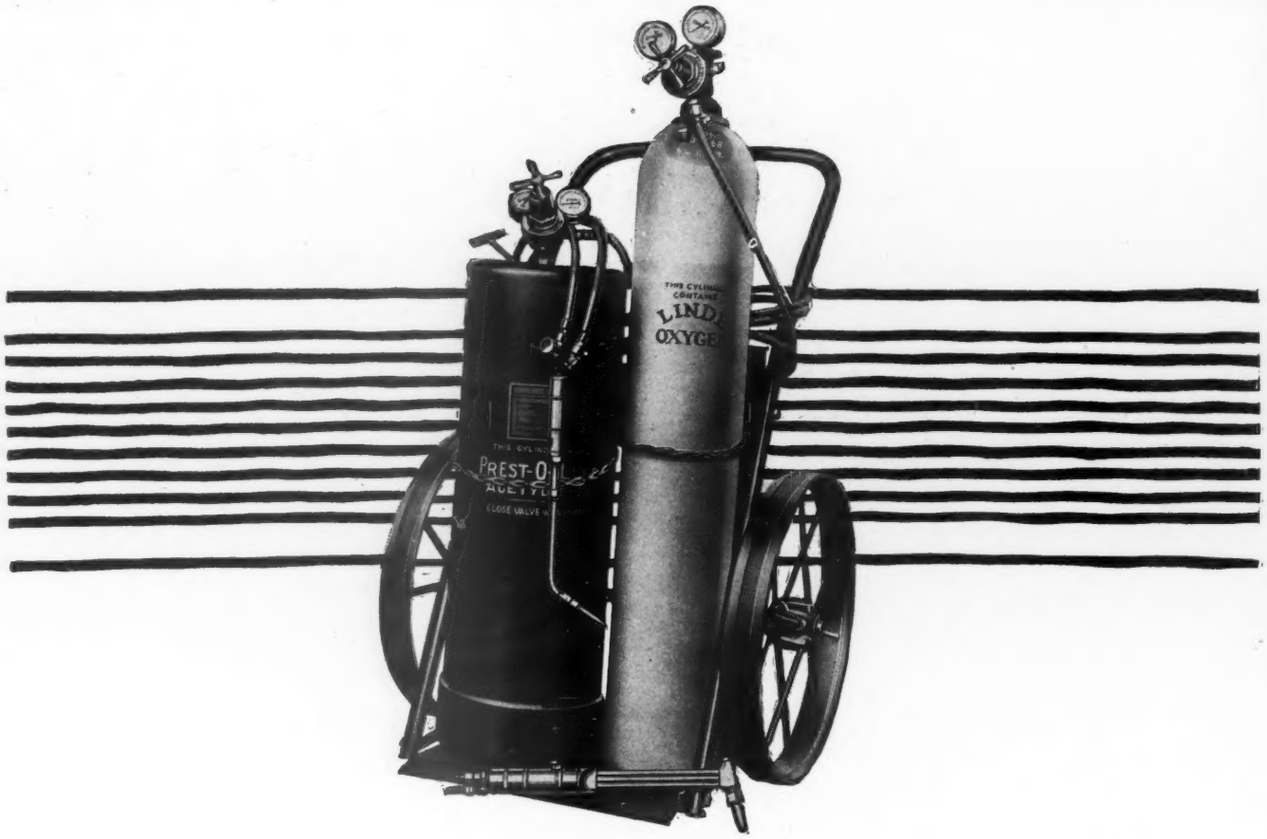

Why not do welding?

A GOOD mechanic can learn to use an oxy-acetylene blowpipe quickly. And with it he can do many jobs that are profitable.

Why not give yourself or your shop the benefit of this profitable business?

Prest-O-Weld blowpipes are reasonably priced and in addition they are made by the same company that makes the famous Oxweld blowpipes. That means they are good!

Sold by jobbers everywhere.

OXWELD ACETYLENE COMPANY
Unit of Union Carbide and Carbon Corporation
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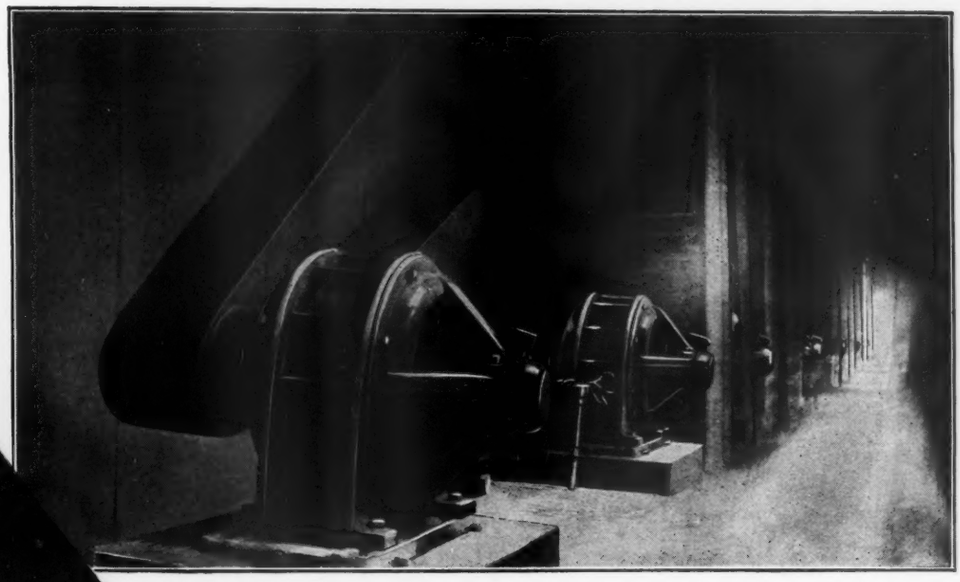

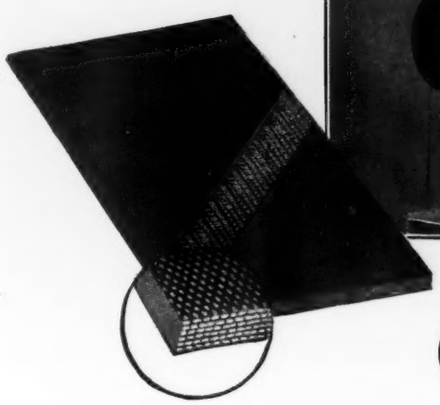

Every Superintendent FACES This Problem

There are no folds or seams in Goodrich "1788 Highflex" Belt, illustrated above. Ply for ply it is just as strong as any belt, yet the construction is so flexible and compact that 7 or 8 plies can be used on pulleys where other belts must be limited to 6 plies. That's one of many reasons why "1788 Highflex" affords greater driving power on overloaded drives.

Send for Bulletin 2105 which gives complete information on this belt construction.

The rule says there should be 4" of pulley diameter per ply of belt—but what are you to do when you need a 9-ply belt to pull the load with a 24" pulley?

One superintendent had 14 tube mills grinding Portland cement; motor pulley 24", driven pulley 96"; 24 inches wide, endless, speed 3800 f. p. m.; 220 H. P.; excessive dust; full load starting. Eight-ply belts not only bootlegged but stretched badly, as did triple leather belts. Then he ordered a 9-ply endless Goodrich "1788"—and later bought thirteen more for the entire line of drives. After two years, none of the 14 belts have stretched beyond the take-up limits and none have been shortened. Eight required no attention at all during the first six months. 17,056 mill hours is the average service of these 14 Goodrich belts.

If *you* want service like this, specify Goodrich "1788 Highflex."

THE B. F. GOODRICH RUBBER COMPANY
Established 1870 Akron, Ohio

Goodrich

"1788 Highflex" Belt

Another Dorrco Moves Onto the Job!

A Dorrco Sand Washer about to be trucked from the shops to its destination aboard a dredge.

TWENTY-THREE Dorrco Sand Washers are now operating in thirteen different states, spread from Massachusetts to California. In every case they are doing their jobs in a satisfactory, dependable manner. Two companies have each *twice* ordered additional machines as a result of the successful operation of the first units installed.

Dorrco Sand Washers are tough, rugged machines designed for just one purpose—to remove silt and organic impurities from bank or dredge sand.

Dorrcos handle up to 200 tons of material per hour, consume less than 10 H.P. at normal loads, and deliver the washed sand, drained to from 15-20% moisture.

If you are having trouble from rejected shipments, or from excessive repair and maintenance costs on your present washing equipment, you will be interested in our Sand Washer Bulletin No. 4171. Write to our nearest office for a copy.

DORRCO

The Mark of Dorr Service

THE DORR COMPANY

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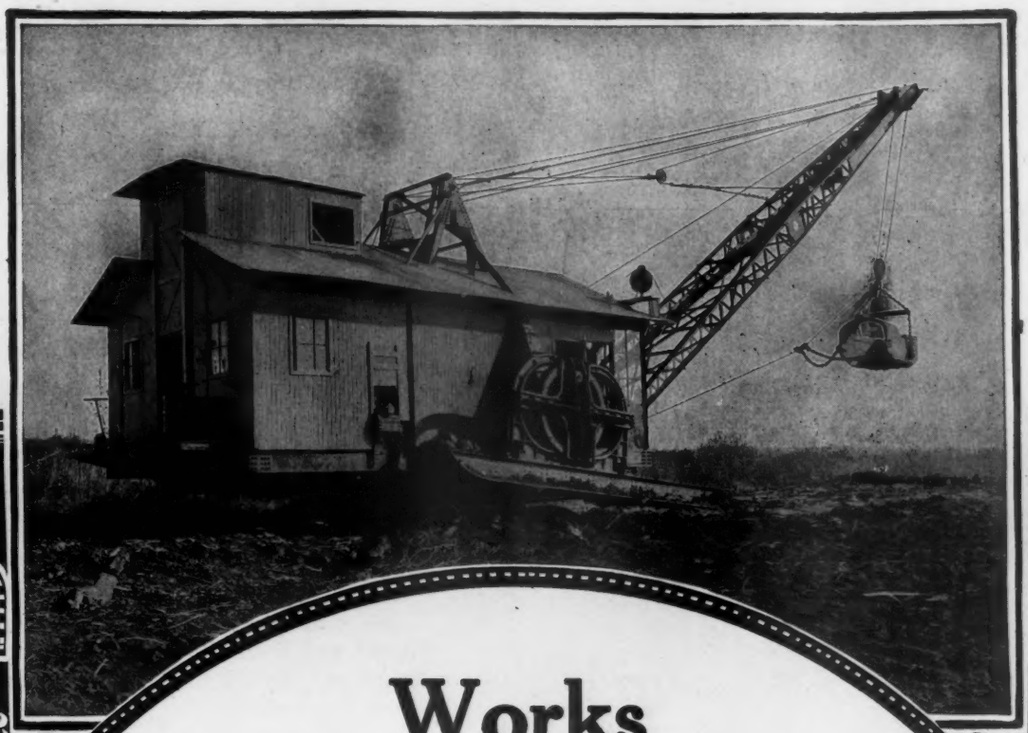
INVESTIGATION TESTS DESIGN EQUIPMENT



Works When Other Excavators Are Idle

Because of its walking traction, the Monighan Walking Dragline Excavator goes where you want it to and therefore always can be kept in the most advantageous working position.

It side-steps obstructions and makes sharp angle turns instead of long circular sweeps.

It digs cuts much wider than its boom length.

It works and travels on marshy surfaces or those that have been made soft by heavy rainfalls. Where machines with other types of traction would be badly delayed or completely mired, the Monighan Walker keeps right on working.

Economically strips a heavy overburden to uncover shallow deposit of sand, stone or gravel, and the same machine can be used for loading and dumping, that is used for stripping.

The Monighan Manufacturing Corp.
949 N. Kilpatrick Ave. Chicago, Ill.

You Can't Beat It

¶ Keeps always in the most advantageous working position.

¶ Side-steps obstructions.

¶ Digs wider cuts.

¶ Reduces capital investment.

¶ Works and moves on surfaces that mire excavators having other types of traction.

MONIGHAN

"To appreciate this shovel you have to see it at work"

Here's a BUCYRUS-ERIE Heavy Duty Shovel giving steady, big output in tough digging in the quarry of the Phoenix Portland Cement Company, Nazareth, Pa.

So many owners of BUCYRUS-ERIE Machines have made this statement, that we were particularly pleased to read it in a letter from such an authority as R. T. Gent—

Who is superintendent of the New York Trap Rock Corporation, New York, N. Y., with plants at Verplanks Point, Cedar Cliff, Clinton Point and Tomkins Cove. This is one of the big concerns with an unusual shovel experience—they *know* shovels, and their endorsement carries unusual weight.

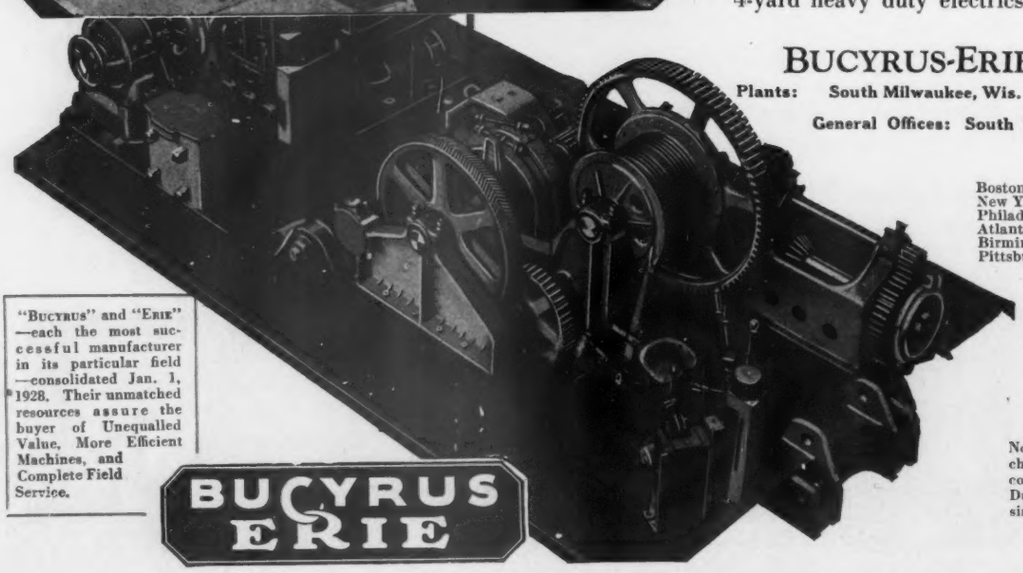
One owner after another has reported Bigger Output and Extra Reliability with BUCYRUS-ERIE 3-yard and 4-yard Heavy Duty Electric Shovels, which is convincing—but just inspect one for yourself. Note the speed and power it demonstrates in hard digging.

Get Up Into the Cab

and size up the extreme simplicity of the machinery. There's a big extra margin of rugged strength right through, with hammered steel shafts, gears cut from solid steel. You'll understand why owners tell us that BUCYRUS-ERIE Heavy Duty Shovels have no equal for simplicity and ruggedness.

As Mr. Gent writes: "We have had no delays at all, and do not look for any, as this machine is so sturdy we cannot see a weak point."

You can expect the same results with BUCYRUS-ERIES on your work—write us about it. We'll be glad to help you figure the results that you can expect with BUCYRUS-ERIE 2-yard, 3-yard and 4-yard heavy duty electrics.



Note the compactness of the machinery unit, the power units and control panels. BUCYRUS-ERIE Heavy Duty Shovels have no equal for simplicity and rugged strength.

"BUCYRUS" and "ERIE"—each the most successful manufacturer in its particular field—consolidated Jan. 1, 1928. Their unmatched resources assure the buyer of Unequalled Value, More Efficient Machines, and Complete Field Service.

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY

Plants: South Milwaukee, Wis. Erie, Pa. Evansville, Ind.

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Birmingham	Dallas
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Representatives throughout the U.S.A. and Canada

Offices and agencies in all the principal countries throughout the world.

Performance Sold This Pulverizer

When Lytle Brothers bought their Jeffrey Swing Hammer Pulverizer to reduce gravel to concrete sand, they knew exactly what the machine would do.

They had already seen a Jeffrey Pulverizer at the Johnson Sand and Gravel Company's neighboring plant taking three hundred tons of gravel a day, some of it six inches in diameter, and reducing it to concrete sand.

This gravel is pumped up from the Cuyahoga River and is screened out and sent through the Jeffrey Swing Hammer Pulverizer which turns it into concrete sand selling at a comfortable margin of profit.

A screen test in our laboratory will give you definite information about the Jeffrey Swing Hammer Pulverizer best suited to your needs and its output per hour for the specified degree of reduction. Write for Catalog No. 450-A.

The Jeffrey Manufacturing Company
935-99 North Fourth St., Columbus, Ohio

New York, Buffalo, Utica — Rochester, N. Y., Philadelphia — Pittsburgh, Scranton, Pa. — Boston, Cincinnati — Cleveland, Detroit — Chicago, Charleston, W. Va. — Milwaukee, St. Louis — Denver, Salt Lake City — Atlanta, Birmingham — Houston, Montreal

51 YEARS OF SERVICE TO INDUSTRY

JEFFREY
MATERIAL HANDLING EQUIPMENT

Jeffrey Products
Elevators—Conveyors
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Skip Hoists
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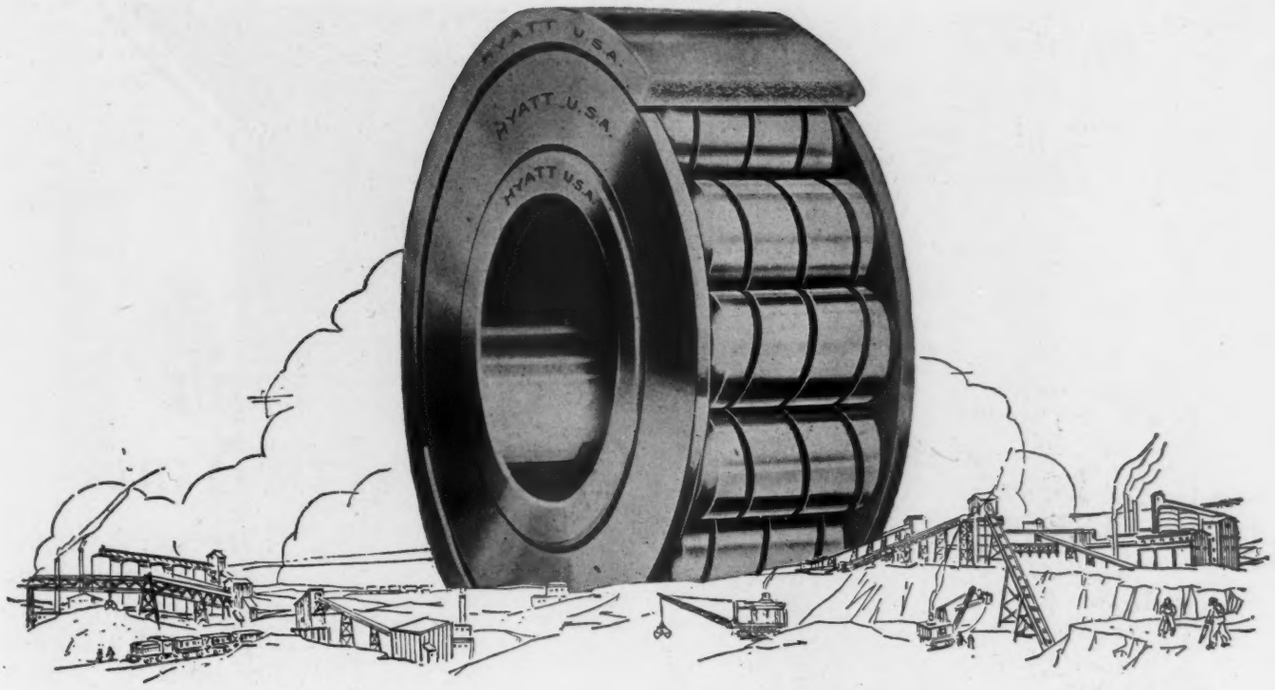


Enemies of Friction ... Friends of Power!

PRODUCTION must be swift . . . consumption of power must be constant . . . material handling equipment must be free-running. Human and mechanical energy must be conserved.

In the wasteless transmission of power and in the effortless handling of materials, Hyatt Roller Bearings play an essential part. Practically every production operation can be rendered more profit-saving by these enemies of friction . . . these friends of power.

Therefore it pays to specify Hyatts for your conveyors, shovels, cars, hoists, drills, tractors and all other operating equipment.

HYATT ROLLER BEARING COMPANY

Newark Detroit Chicago Pittsburgh Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

When writing advertisers, please mention ROCK PRODUCTS

Sand and Gravel Pumps

Climax Engines are available for sand and gravel pumps ranging from 4" to 8" sizes. Larger if head is low.

Generators

Climax Engines for generators up to 90 KW, belt or direct connected.

Rock Crushers and Sawmills

This is the type of mounting for Climax rock crusher drives ranging from 40 to 140 horsepower. For sawmill work the model TU shown produces from 10,000 feet to 14,000 feet of lumber per day — every day. This means profits.

Water Pumps

There is a Climax Engine Model for Water pumps with capacities from 500 to 6000 gallons per minute.

Built For You

Whether you want power for a sand and gravel pump, a portable stone crusher, sawmill, generator, pump or hoist, Climax Engines are built for you. They are built for a man who is interested in getting things done — for the man who closely guards his costs. Climax Engines range from 40 to 140 horsepower. The units come fully equipped, ready to operate. No engineering to do. Power take-off including clutch, pulley, flexible coupling or reduction gear can be furnished according to need.

Give us an idea of the application you have in mind. We'll send full information.

CLIMAX ENGINEERING CO.
78 W. 18th Ave., South Clinton, Iowa

CLIMAX

Trade Mark Reg. U. S. Pat. Off.

Cadet Light
Especially desirable for small stopes and roof trimming. Weighs 30 lbs. charged. One full charge burns for 5 hours.

This photograph was taken in a large zinc mine. The stope is about 50 ft. high. Notice how clearly the boulders on the slope can be seen. One Carbic Light (Style No. 2) was used for illumination.

Style No. 2
For illumination in large stopes. Weighs 37 lbs. empty and 115 lbs. charged. One full charge burns for 12 hours.

Prevent accidents in the stopes —*use more light*

THE constant danger that exists in stope mining operations is well known to safety engineers and operators. Roof falls and boulders rolling down the slope are the frequent cause of accidents. With only the individual lamps carried by the miners it is difficult for them to see the condition of the stope. More light will help prevent these accidents.

A powerful flood light

The Carbic Flood Light is exceptionally well suited for stope illumination. Tests carried on during the past year in metal mines in various sections of the country have proved the advantages of the Carbic Light for this purpose. A Carbic Light will clearly illuminate the largest stope so that the entire working area stands out in sharp relief.

Carbic is distributed by the Union Carbide Sales Company through its national chain of warehouses and is sold by jobbers everywhere.

The Carbic Light is not new

Its dependability has been proven by more than 14 years of use on the surface. Thousands of Carbic Lights are being used by contractors for night work.

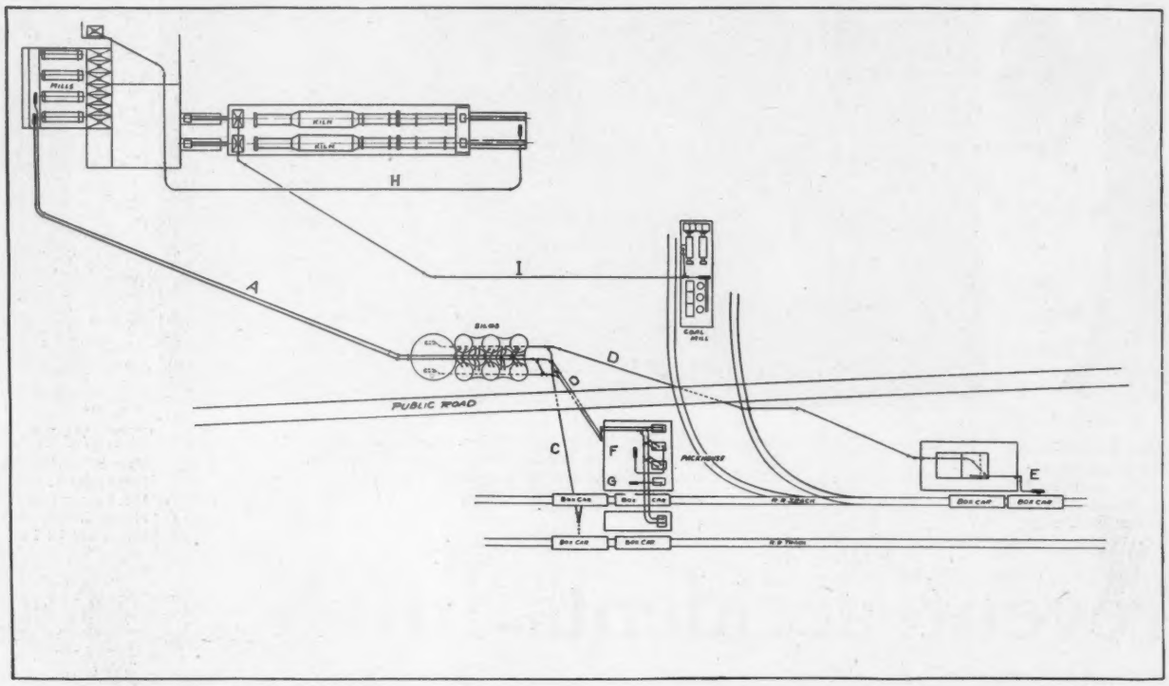
The Carbic Light is simple in construction. It can be charged in three minutes. There are only three parts. It is portable. It can be easily carried from stope to stope. It is absolutely safe. If it is knocked over, the water runs out and generation stops immediately. The Underwriters' Laboratories, Inc., list the Carbic Light as standard.

If your jobber cannot supply you, write to our nearest district office.

OXWELD ACETYLENE COMPANY
Unit of Union Carbide and Carbon Corporation
New York City, 30 East 42d St. — UCC — Chicago, Peoples Gas Bldg.
San Francisco, Adam Grant Bldg.

CARBIC LIGHT

Fuller Kinyon at



Line Diagram of the Fuller Kinyon Systems at Valley Forge

A—Two independent four-inch Fuller-Kinyon Systems delivering cement from mills to silos. Longest pumping distance 770 feet including rise of 100 feet. Each line includes 5 two-way and 5 three-way distributing valves.

B—Two interconnected five-inch systems, with three portable Fuller-Kinyon Pumps for withdrawing cement from silos, arranged for delivery to four packer bins under complete automatic and remote control of filling the bins. Longest pumping distance 416 feet including rise of 56 feet.

C—Branch of the portable pump systems for loading box cars in bulk. The cars may be loaded rapidly to a flat level by a movable pipe bend at the discharge end of the line.

D—Branch of the portable pump system for delivering cement from the silos directly to a concrete products plant. Longest pumping distance 852 feet including a rise of 50 feet.

E—Box car unloading system for delivering pulverized material from box cars to bins in the cement products plant. Four-inch Fuller-Kinyon Pump, 2½" transport line.

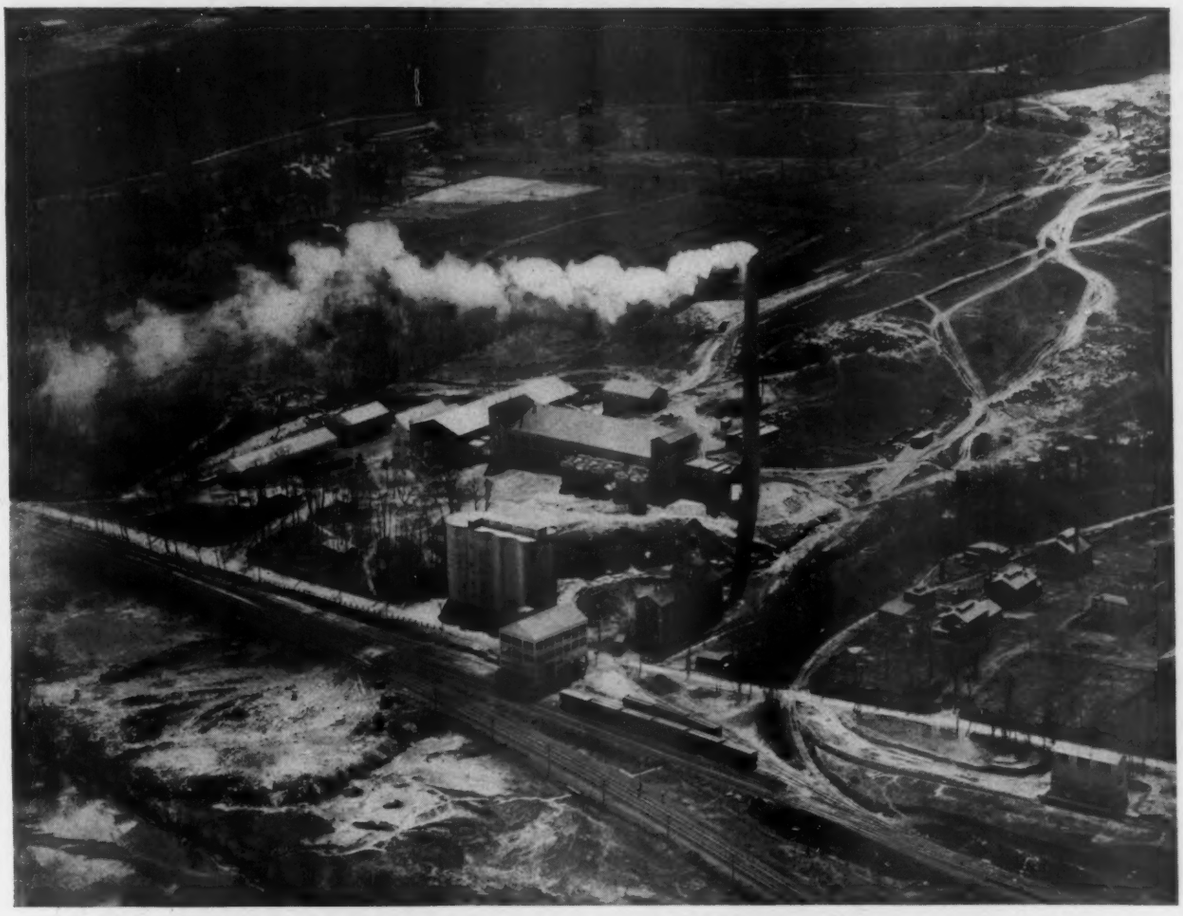
F—Four-inch Fuller-Kinyon Pump, 2½" transport line for returning packer spill to bins.

G—Four-inch Fuller-Kinyon Pump, 2½" transport line for returning packer spill to bins.

H—Flue dust handling system. A four-inch Fuller-Kinyon Pump and 2½" transport line delivers the dust to a bin in the raw department. Total distance 611 feet.

I—Six-inch Fuller-Kinyon Pump, four-inch line delivering pulverized coal to dryer and kiln bins under automatic and remote control. Longest pumping distance 727 feet including rise of 104 feet.

Valley Forge



Aerial Photograph of the Plant of the Valley Forge Cement Co.

Extremely rugged ground with abrupt changes in elevation, poor soil conditions for building foundations, and the location of the railroads and the highway account for the unusual arrangement and wide separation of the individual plant buildings. Ten Fuller-Kinyon Pumps in the systems shown and described on the opposite page, unite the scattered units and provide an ideal flow sheet. It is our opinion that flexibility in layout and the economy in operation of the Fuller-Kinyon System made possible the erection of a cement plant on the present site.

One interesting feature is the pumping of cement from the silos directly to a cement products plant located near the site of the cement plant.

All pipe lines are buried underground to avoid interferences with yards, clinker storage, roads, and railroads.

FULLER COMPANY

CATASAUQUA, PA. U. S. A.

When writing advertisers, please mention ROCK PRODUCTS

Large photograph shows dipper teeth in action. Insert shows a set of Stellited teeth. The white band on each tooth is the Haynes Stellite.

Teeth that suit to "Perfection"

THE Perfection Coal Company of Duquoin, Illinois, has standardized on Stellited dipper teeth.

Forty-seven feet of earth must be removed before that precious vein of coal is reached. Multiply this by the thousands of acres leased by the Company, and you can see that it is a man's size job.

It's a big assignment for dipper teeth. But for teeth coated with Haynes Stellite, this is all in a day's work. This company reports that Stellited teeth last four times longer than the special steel teeth formerly used.

If you have had experience with Haynes Stellite, this will not surprise you. It has been proved over and over that Haynes Stellite resists abrasion better than any other metal. It is easily applied, too. Simply flow a layer of the molten metal over the cleaned and heated surface of the wearing part with the oxy-acetylene flame, using an excess of acetylene.

Ask our nearest district office for the booklet, "Stelliting of Metal Parts in Cement Mills." We know it will interest you.

HAYNES STELLITE COMPANY
Unit of Union Carbide and Carbon Corporation

UCC

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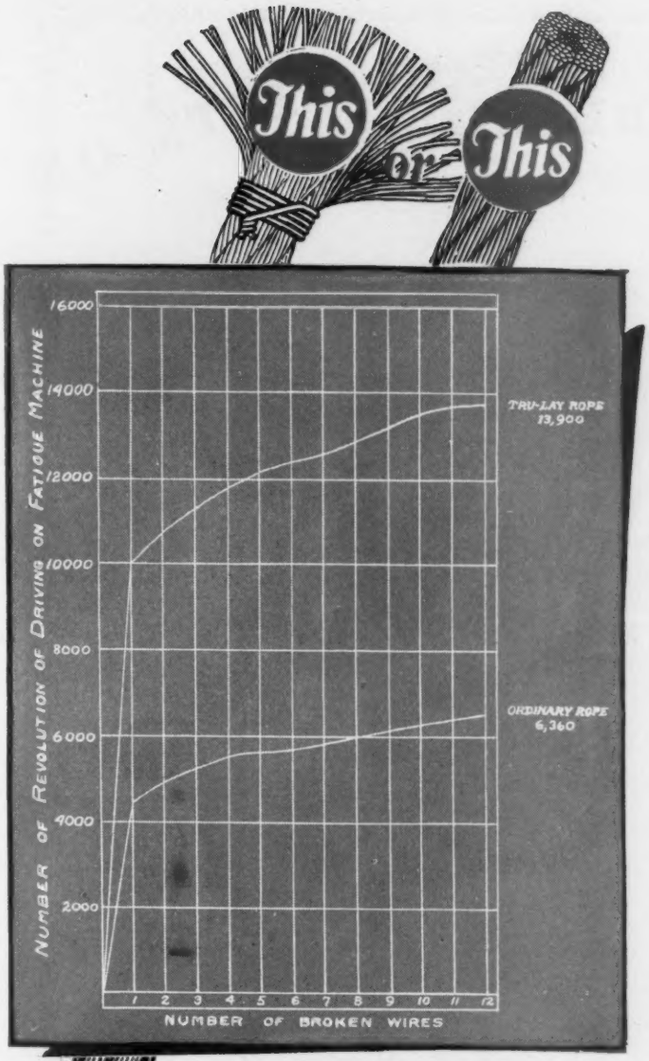
Stelliting with

HAYNES STELLITE



These TRU-LAY tests verify the records OF actual service

THE above chart points the way which has brought increased service to thousands of wire rope users. The object of these tests was to determine the durability of wire rope used over sheaves. Each rope made four reversed bends per revolution. All makes are subjected to the same identical condition.

Note the points where 12 wires were broken:

Ordinary wire rope—12 wires—broken at 6360 revolutions.

Tru-Lay regular lay—12 wires—broken at 13900 revolutions.

Remember Tru-Lay makes Lang-Lay practical, for it eliminates crankiness—it makes wire rope easy to handle—it cuts without seizing.

Get a sample and prove these many advantages for yourself. The 50% to 130% greater life shown in these tests is being duplicated regularly in actual field service.

Write for a sample today.

AMERICAN CABLE COMPANY, Incorporated

Grand Central Terminal Bldg., New York City

District Offices: Chicago Detroit Philadelphia Pittsburgh San Francisco Tulsa Emlenton, Pa.

An Associate Company of the American Chain Company, *Incorporated*

Dominion Wire Rope Company, *Limited*, Montreal, Sole Canadian Licensed Manufacturers

PREFORMED WIRE ROPE

TRADE TRU-LAY MARK

[Reg. U. S. Pat. Off.]

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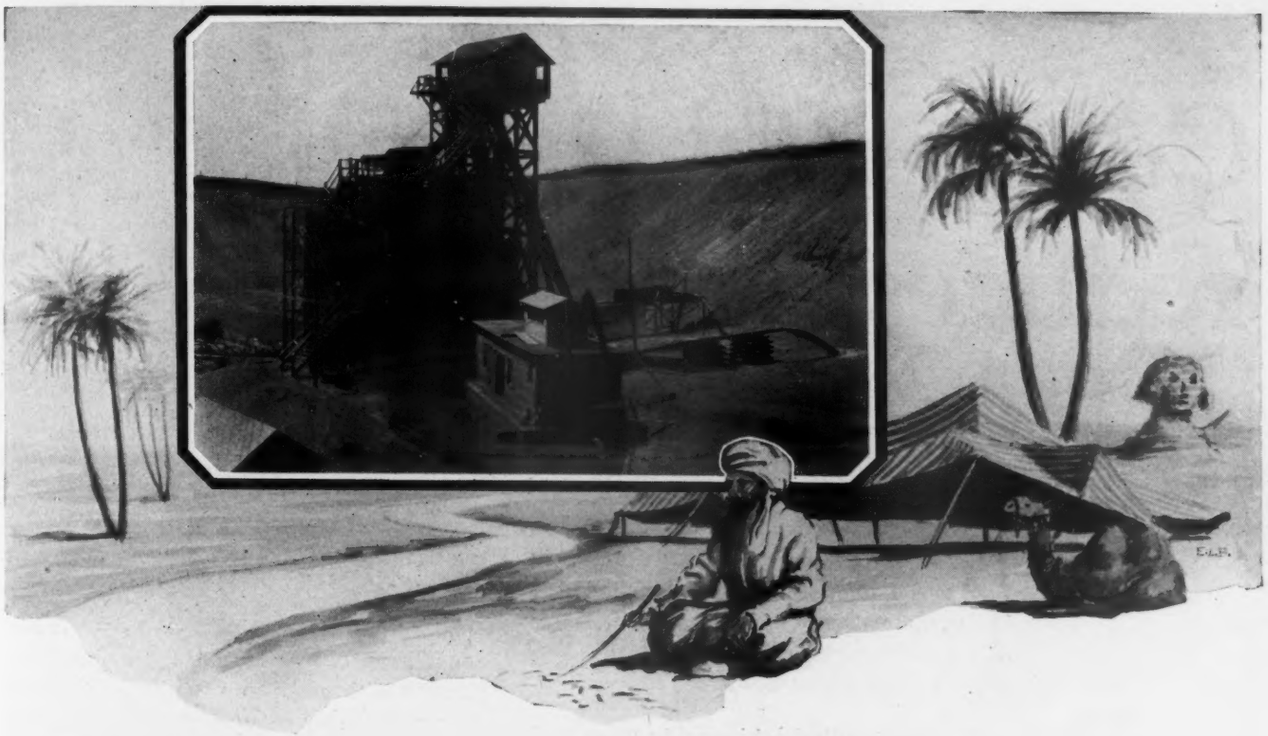
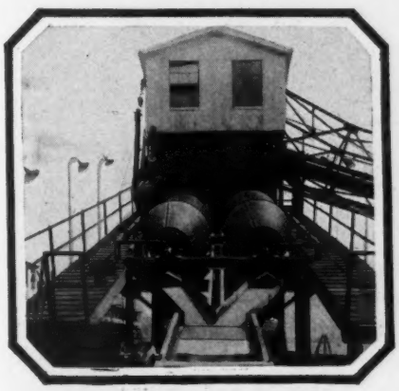




Link-Belt Products

Elevators and Conveyors
Stone and Lime Handling Equipment
Locomotive Cranes
Crawler Cranes
Portable Loaders
Dragline Excavators
Screens
Crushers
Sand Separators
Chains, Wheels, Buckets
Gears, Transmission Machinery

Written in sand

TO THE Arabian nothing is more unstable than the ocean of shifting sand surrounding him. Never for two days is the desert's sandy surface the same. A name written in sand!—an Arab can say nothing worse of any man's stability than that. But with all their centuries of wisdom what do they know about sand as we use it in America?

There's a sand and gravel pit behind every modern building, every concrete road,—there's a place for sand in every step we take along the path of public progress.

Link-Belt equipment for sand and gravel excavating, washing, grading and handling is foremost in the field.

Efficient machinery equipment is a necessity in any profitable enterprise. Use Link-Belt equipment in your sand and gravel business.

LINK-BELT COMPANY 3395

Leading Manufacturers of Elevating, Conveying, and Power Transmission Chains and Machinery

CHICAGO, 300 Pershing Road INDIANAPOLIS, 200 S. Belmont Ave. PHILADELPHIA, 2045 Hunting Park Ave.

LINK-BELT

Sand and Gravel Washing Plants

When writing advertisers, please mention ROCK PRODUCTS

P & H machines have large motors in proportion to their dipper capacities—motors that force the dipper through toughest going. No hesitation, no pecking at the surface—just a solid, sustained drive.

A shovel must be so motored that it can dig, hoist and swing at high speeds if you're to get the capacity at which it's rated. Catalog 62-X gives data on all parts of P & H machines. Looking it over you'll find that a P & H is better prepared, in every way, to give you low cost yardage.

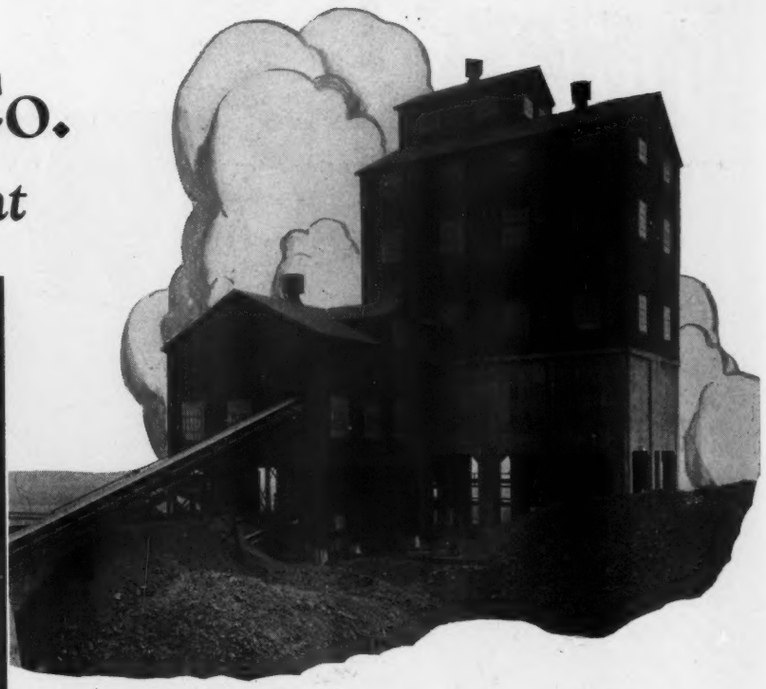
Compare the Motor Sizes on P&H Shovels with those on other Shovels of Similar Capacity

P&H

HARNISCHFEGER CORPORATION
Established in 1884
3865 National Avenue, Milwaukee, Wisconsin

New York, Philadelphia, Birmingham, Chicago, Kansas City, San Francisco, Indianapolis, Charlotte, Detroit, Dallas, Pittsburgh, Portland, Memphis, St. Louis, Los Angeles, Seattle, Jacksonville, Minneapolis, Atlanta, Baltimore, Boston

In
France Slag Co.
South Chicago Plant



Webster Feeders and Pan Conveyors

MODERN methods of material handing prevail in the new plant of the France Slag Company, at South Chicago, Illinois. In this plant, where are found only the most up-to-date equipment and efficient practices, Webster Bucket Elevators, Plate Feeders and Continuous Pan Conveyors were adopted.

For years, Webster Material Handling Equipment has enjoyed wide recognition and acceptance as representing the best in its line. Belt Conveyors, Bucket Conveyors, Skip Hoists, Pan Conveyors, Spiral Conveyors, Chains, Sprockets, Elevator Buckets, Screens, Bearings, Friction Clutches and all other items necessary in handling any class of material constitute the line of quality equipment offered by Webster.

For material handling equipment of all types, our engineering and manufacturing facilities are more than ample. Your satisfaction is assured.

THE WEBSTER MFG. COMPANY
1856 Kostner Avenue
CHICAGO

Buffalo **Cincinnati** **Cleveland** **New York** **Philadelphia** **Pittsburgh**
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WEBSTER
MATERIAL HANDLING EQUIPMENT

When writing advertisers, please mention ROCK PRODUCTS

Strength and Capacity

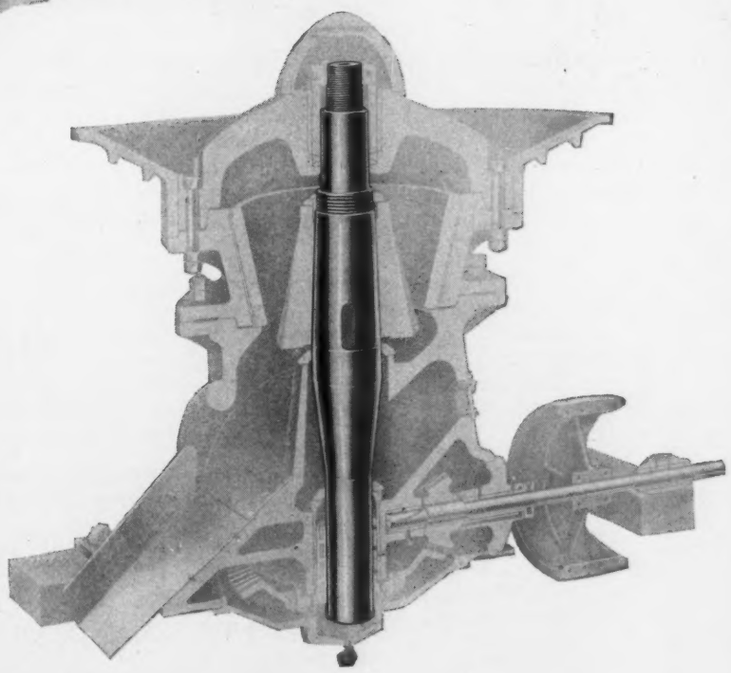
are the biggest things you can buy in a Gyratory Crusher

Austin is now producing a line of crushers to meet the modern demand for a smaller product. These "100-Type" Crushers are the strongest ever built. Equipped with a pumpless automatic oiling system, they have bearings on either side of the driving pinion, a main frame that will permit of any position of the counter shaft and two solid dust-proof diaphragms above the oil chamber.

Strength to "stand up" under severe strains and shocks and the capacity to produce smaller product with the least expenditure of time and horsepower is gained by correct design.

An Unusually Large MAIN SHAFT

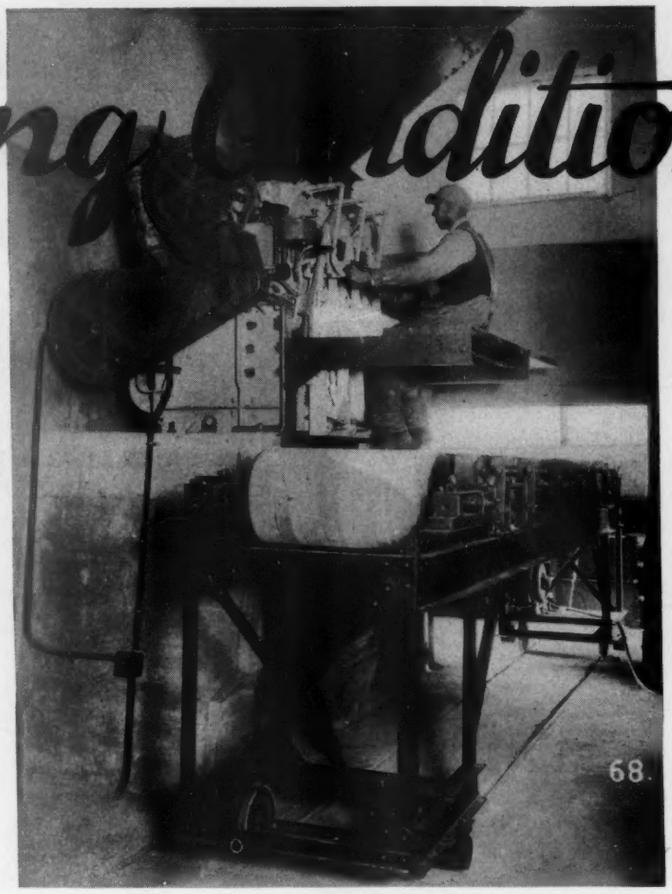
The illustration at the right shows the unusually large dimensions of the main shaft—with consequent crushing strength—provided in Austin 100-Type Crushers. These crushers are designed to meet the demands for smaller and smaller product. The increased strains have been met by the ample proportions of the main shaft in the "recrushing" sizes.



Send for Prices and Catalog

AUSTIN MANUFACTURING CO.
400 N. Michigan Ave., Chicago, Ill., U.S.A.
Established 1858

Working conditions are Ideal!



Bates Valve Packing Machine in a cement plant. The operation is kept free from dust by DRACCO Dust Collecting System.

SURROUNDINGS that are clean and orderly—pure air to breathe—these are factors that go a long way toward making the industrial plant employee satisfied and efficient on his job. Take the dust from a cement, lime or gypsum plant and you have removed the principal objection of labor engaged in these industries.

The DRACCO Dust Collecting System completely eliminates the dust "bogey" that was formerly considered inseparable to plants devoted to the production of cement, lime and gypsum. This system collects the dust and discharges it automatically.

Working conditions are ideal in plants where the DRACCO System has been installed. Labor turnover is minimized—a benefit that in itself is of vast importance to every plant operator.

Men, materials, machinery—these are prime factors in the profitable operation of every industrial plant. The DRACCO System insures adequate protection to all. **Dust** is collected and saved; **machinery** is protected from undue wear caused by flying dust particles; and **men** are provided with working conditions that tend to promote individual efficiency and a feeling of good-will toward the employer.

Our engineers will be glad to co-operate with you toward the solution of any dust problem.

The Dust Recovering & Conveying Company

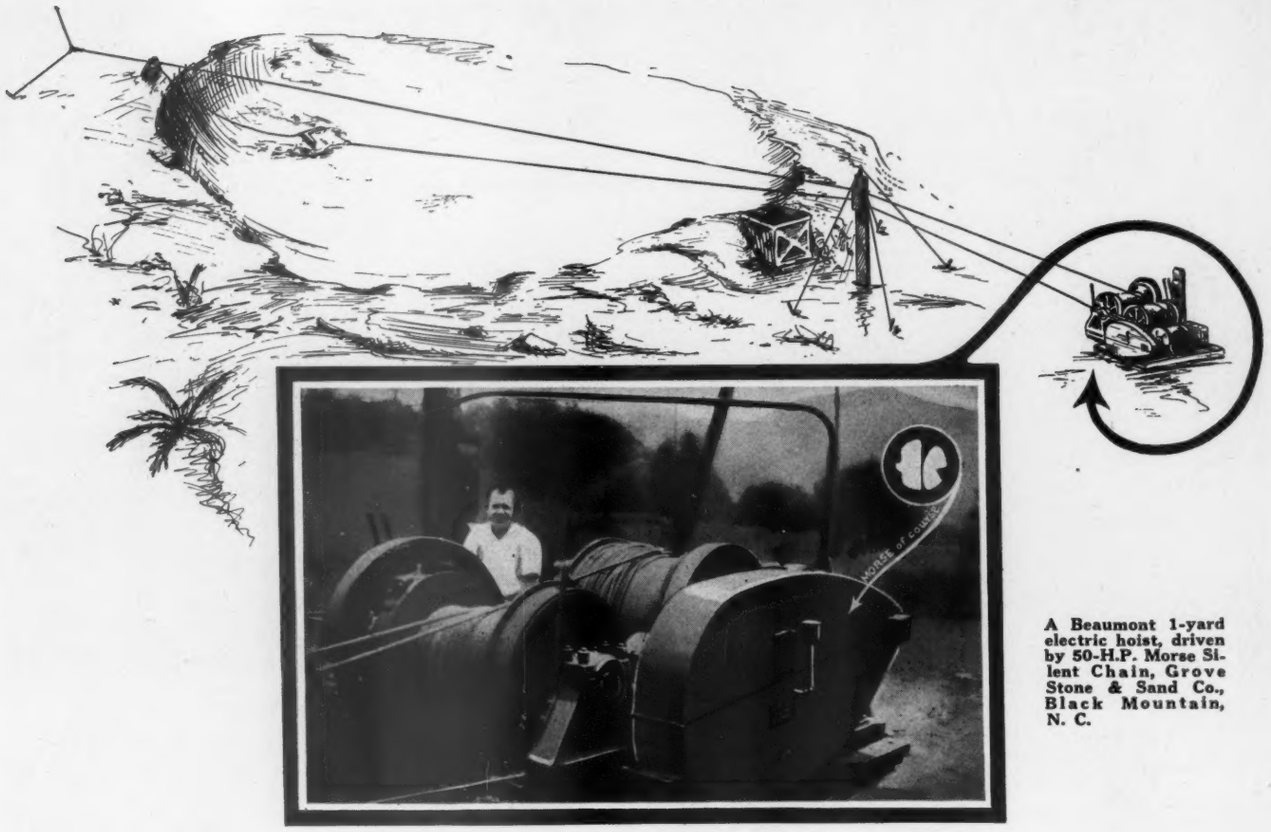
Fume Recovery
Dust Collecting
Pneumatic Conveying

Engineers and Manufacturers
CLEVELAND, OHIO

Equipment
Engineering
Consultation

DRACCO

Dust Collecting Systems



A Beaumont 1-yard electric hoist, driven by 50-H.P. Morse Silent Chain, Grove Stone & Sand Co., Black Mountain, N. C.

Morse, of course, for Beaumont Scrapers

BEAUMONT Drag Scraper Systems are giving good service under all kinds of operating conditions. They are ruggedly built of equipment that will stand the gaff. The hoisting mechanism, for instance, relies on a Morse Silent Chain for its driving power.

Morse Drives, by their dependable, efficient operation, are helping to give extra years of service to material handling equipment of all types. They are 98.6% efficient, positive, flexible. Ideal for short centers. A Morse Transmission Engineer may be able to help in your power drive problems. Just consult the nearest office.

MORSE CHAIN CO., Ithaca, N. Y., U. S. A.

Atlanta, Ga.	702 Candler Bldg.	**Denver, Colo.**	211 Ideal Bldg.	**Omaha, Neb.**	923 W. O. W. Bldg.
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2050

MORSE SILENT CHAIN DRIVES

Now They're Shipping **Paint** in Bags

to lower packing and transportation costs and to preserve the paint itself...

Bag Factories
St. Louis
Minneapolis
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Indianapolis
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Kansas City
Seattle
Winnipeg
Houston
Brooklyn
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Wichita
Ware Shoals, S.C.

Cotton Mills
St. Louis
Indianapolis
Bemis, Tenn.

Bleachery
Indianapolis

DRY paint, of course — and that's the point. Like many other mineral products, this metallic paint must be *kept* dry.

So The Clinton Metallic Paint Company uses Bemis Waterproof Bags—which protect the paint from loss and deterioration in freight cars; and from the elements on open platforms and trucks.

There's a saving, too, compared with the old way of shipping in barrels. First, a lower initial cost, and then constant savings in handling, storage space, and freight.

The tough, sturdy construction of Bemis Waterproof Bags is saving money for hundreds of shippers, and safe-guarding their many different kinds of products and the longest shipments.

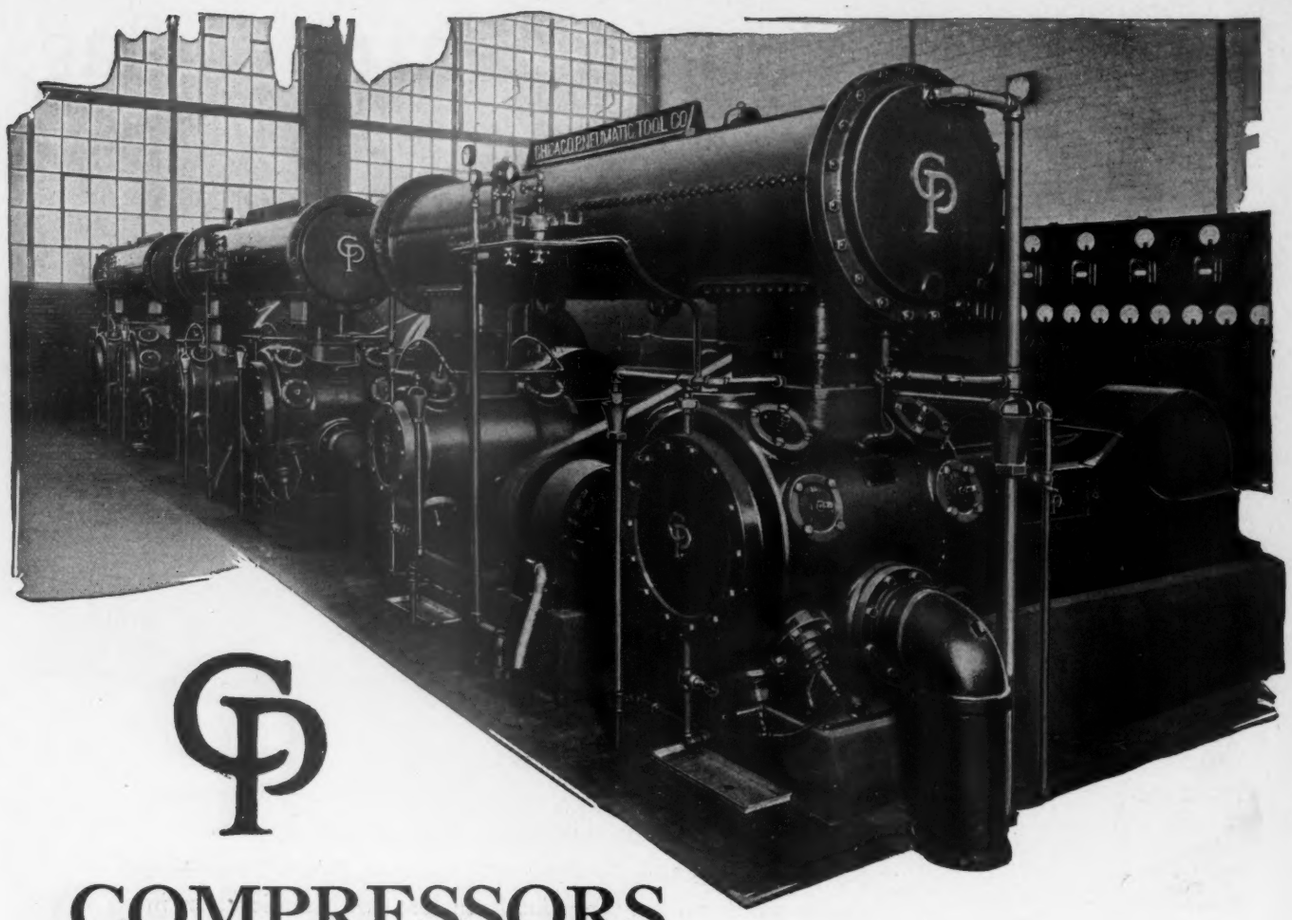
These bags are so remarkably successful and economical that you owe it to yourself to investigate them closely. Address:

BEMIS BRO. BAG CO.
410 Poplar Street, St. Louis, Mo.

BEMIS
WATERPROOF
BAGS

MR296

SINCE 1858, THE WORLD'S LARGEST MAKERS OF QUALITY BAGS



COMPRESSORS

SIMPLATE Flat Disc Valves:—exceptionally large bearing surfaces;—totally enclosed frame construction; automatic lubrication throughout;—automatic regulation;—these are the outstanding features which enable Chicago Pneumatic Air Compressors to develop high volumetric efficiency with low power consumption per unit of air actually delivered. Their efficiency and reliability are demonstrated in every CP installation.

There is a type and size for your requirement, with a satisfactory performance record. Write for Bulletin.

After all, what users say counts most!

"We are glad to express our utmost satisfaction with the Simplate Valves which we have been using in the air compressor originally bought from you. These valves came with the compressor and have been subject to heavy and continuous service for about two and one-half years. They have stood up to their work wonderfully and they are still in good working order. We feel that they are deserving of any good words we may be able to say for them."

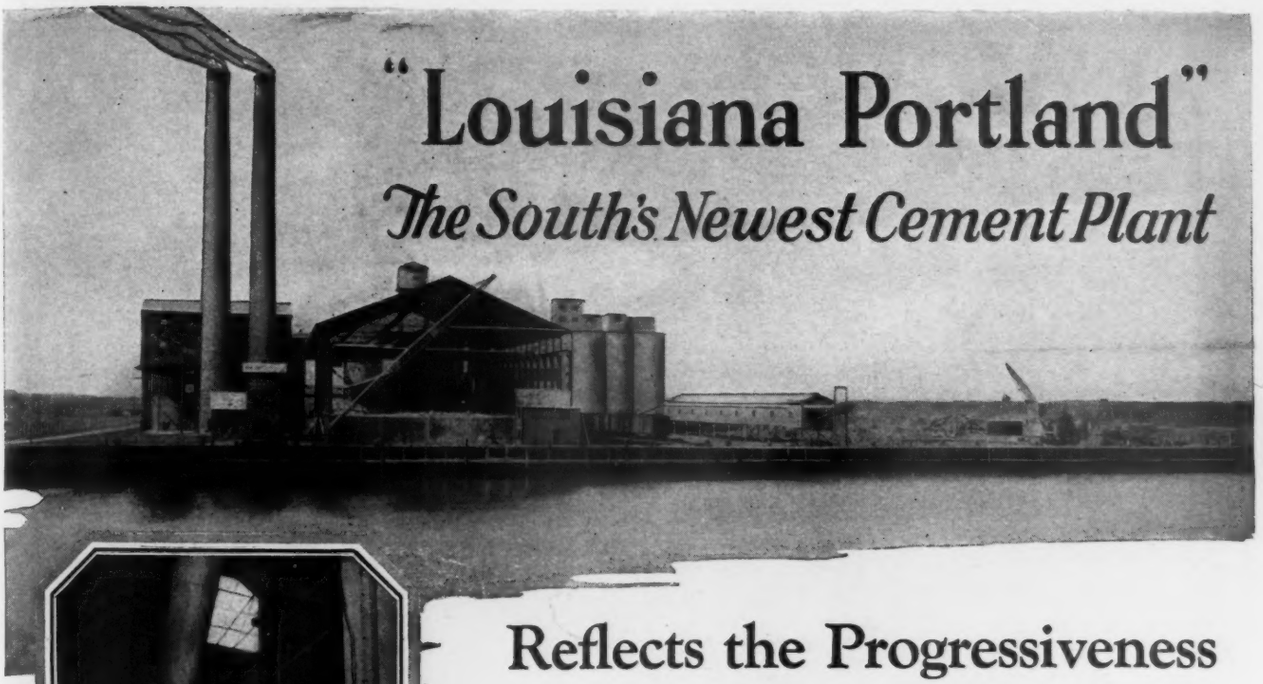
Photostat copy on request.

C-255

Chicago Pneumatic Tool Co.

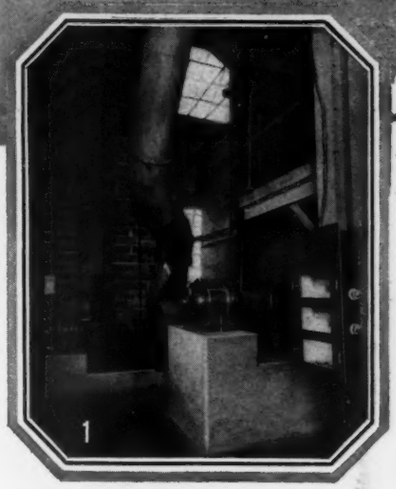
Sales and Service Branches all over the World

6 East 44th St. New York, N. Y.



"Louisiana Portland"

The South's Newest Cement Plant



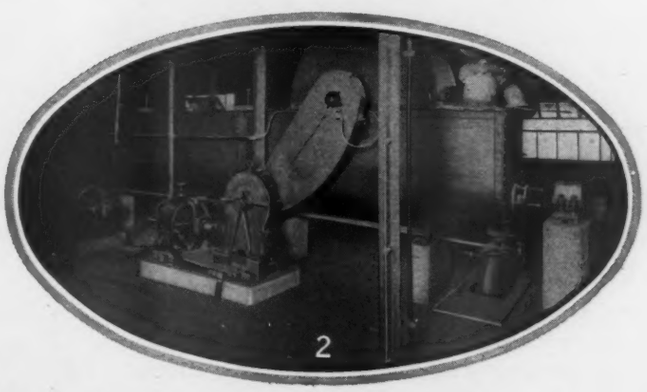
Reflects the Progressiveness of a Great Industry

At New Orleans stands completed a remarkable cement plant—"Louisiana Portland". It is the latest unit of the International Cement Corporation—an organization which has engineered and constructed many of the best cement plants here and abroad.

Mechanically and electrically, "Louisiana Portland" is as near perfection as a cement plant can be built to-day. Its electric equipment—to the last motor and controller—is all General Electric. We present herewith, pictorially, a striking demonstration of the cement industry's leadership in the utilization of electric power—through G-E Motorized Power.

1 *A 30-hp. wound-rotor motor and a 25-hp. squirrel-cage motor driving coal fans*

2 *3-hp. direct-current motors driving the slurry feeders*



Apply the proper G-E motor and the correct G-E controller to a specific task, following the recommendations of G-E specialists in electric drive, and you have G-E Motorized Power. Built in or otherwise connected to all types of industrial machines, G-E Motorized Power provides lasting assurance that you have purchased the best.

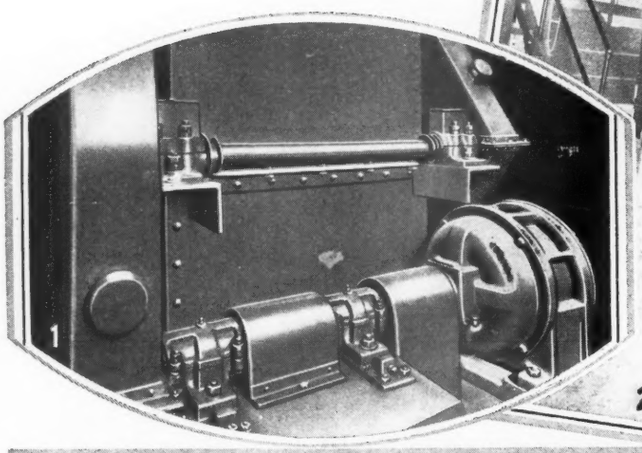
Motorized Power
—fitted to every need

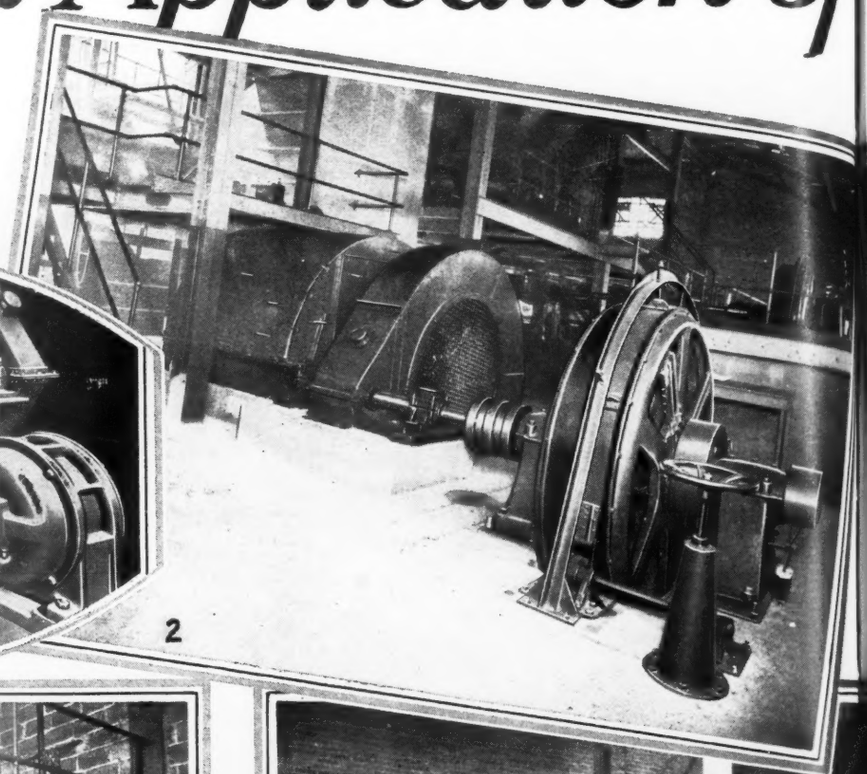
200-178

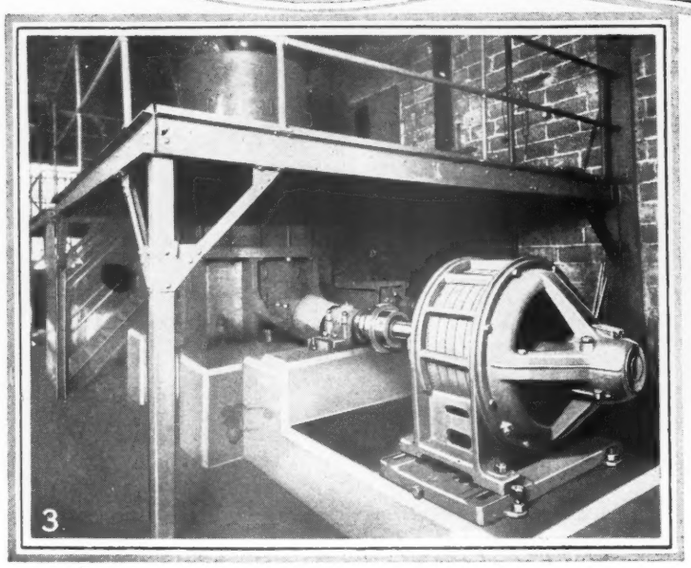
GENERAL ELECTRIC

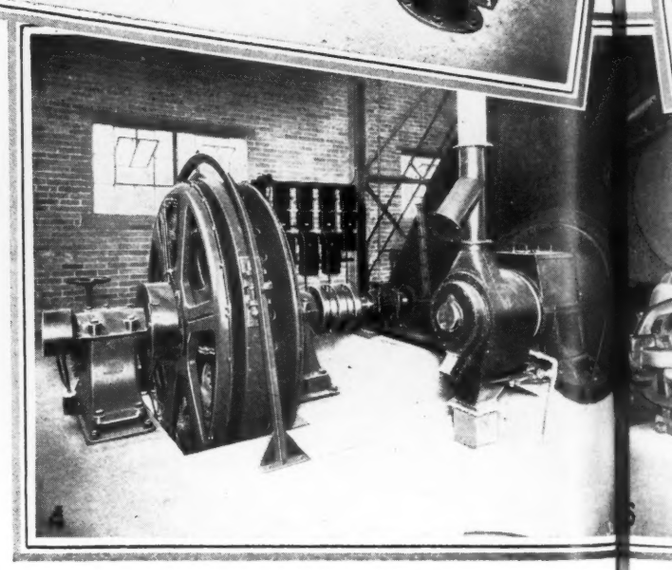
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

A Model Application of G









1 Every elevator head drive is powered by a G-E squirrel-cage motor—usually of 10 hp., driving through a speed reducer and a silent chain

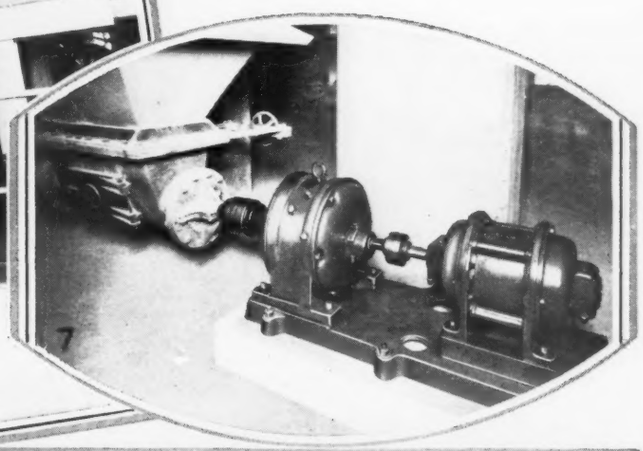
2 A 125-hp. Super Synchronous motor driving a Smidth Kominuter in the raw-grinding department

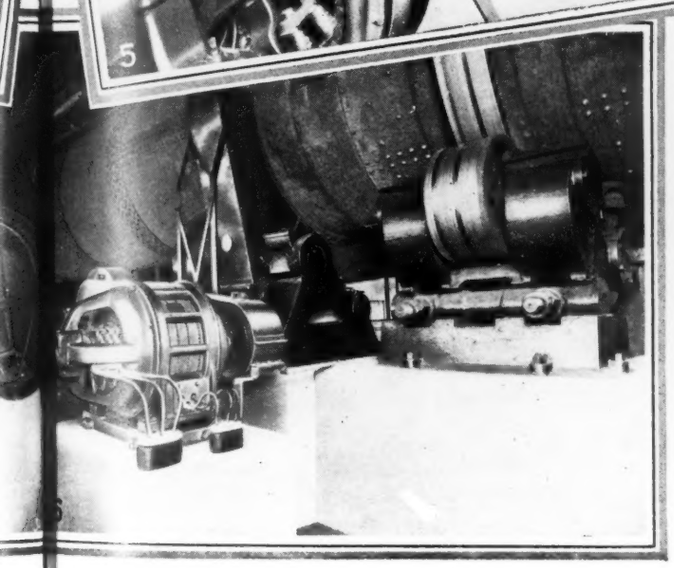
3 100-hp. squirrel-cage motor direct-connected to a Fuller-Lehigh mill in the coal mill

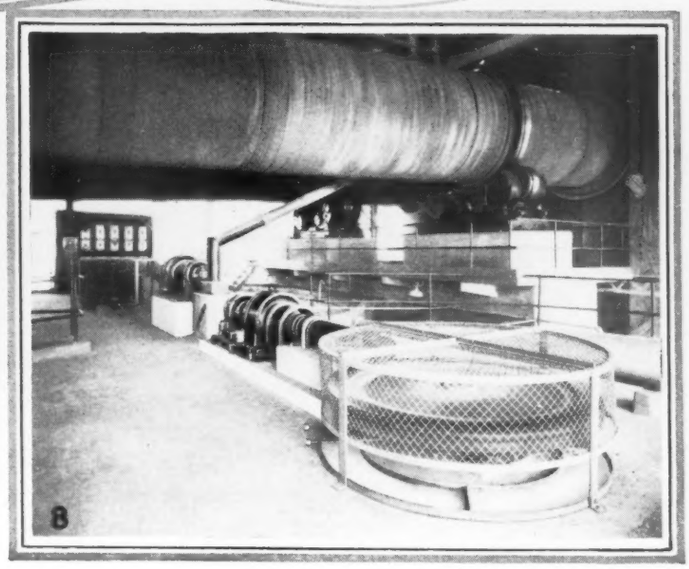
4 A 600-hp. Super Synchronous motor driving a Smidth tube mill in the finish-grinding department. There are four of these mills—two in the raw-grinding and two in the finish-grinding departments

GENERAL

# of G-E Motorized Power







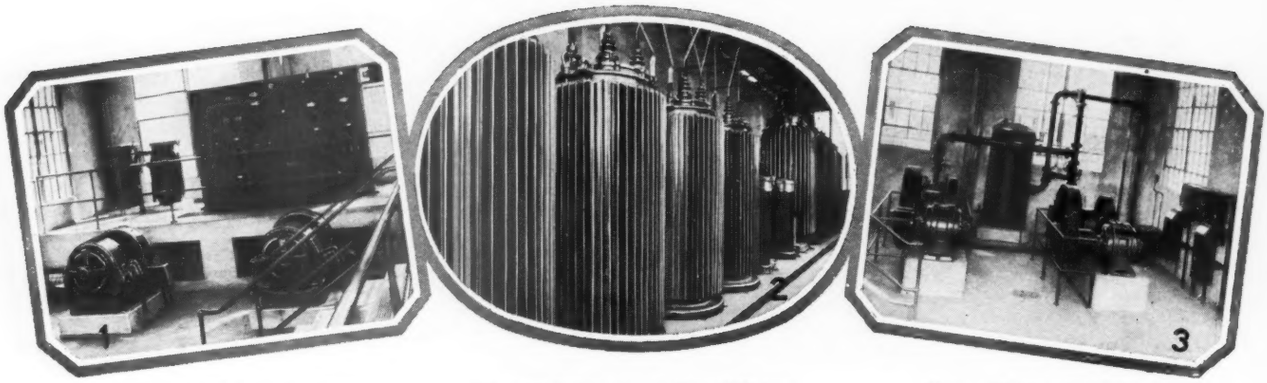
5 300-hp. Super Synchronous motors driving Bradley Hercules Mills in the finish-grinding department

6 A 60-hp. wound-rotor motor driving a Reeves kiln

7 A 10-hp. squirrel-cage motor driving a screw conveyor under cement silos. Practically all screw conveyor drives are standard with motors varying from 10 to 25 hp.

8 20-hp. squirrel-cage motors driving agitators in slurry-storage basins. Note modern installation of controllers in the background

ELECTRIC



Auxiliary switchboard, motor-generator sets, and lighting transformer

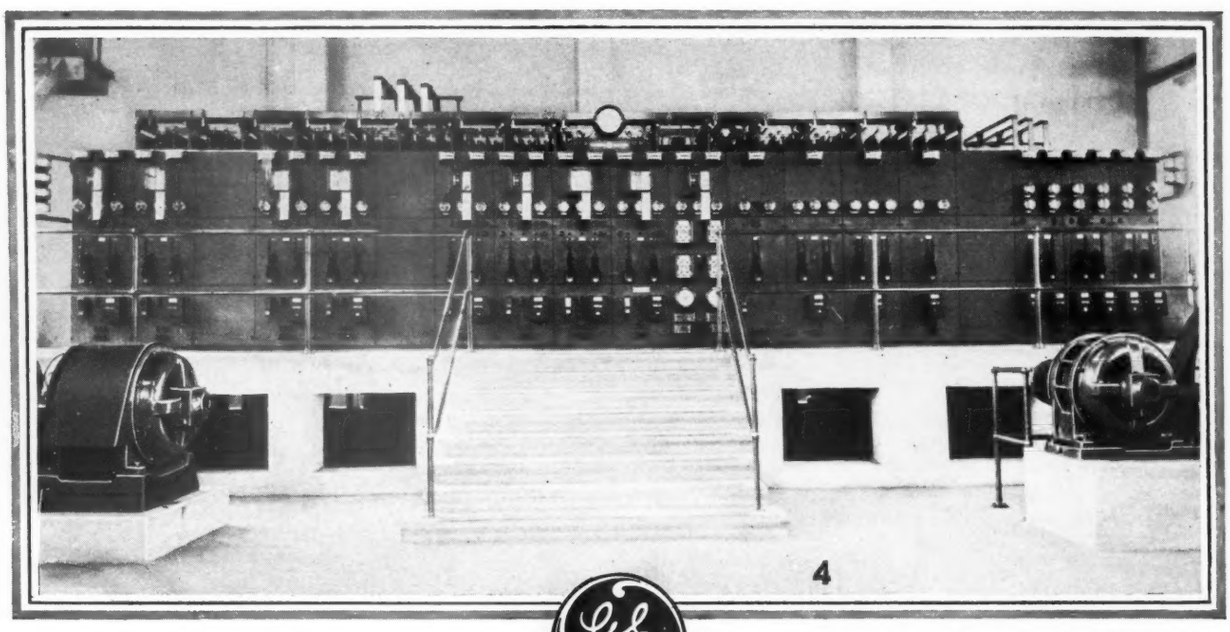
The transformer room. Four 1000-kv-a., 13,200/2300-volt transformers. Four 333-kv-a., 13,200/400-volt transformers. The two small auto-transformers in the center are used to start the Super Synchronous motors

Two 75-hp. squirrel-cage motors operating Ingersoll-Rand air compressors through short-belt drives

The Leadership of G-E Motorized Power

The day has passed when cement men had to be convinced of the superiority of the electrified plant. With a universal acceptance of electrification, the question is no longer, "Shall we electrify our plant?" but, "Which type of electric equipment shall we choose?" G-E Motorized Power has answered the second question for so many successful cement plants that it has won a position of outstanding leadership in the rock products industry.

Whether or not you use G-E equipment, you are welcome to the extensive data which G-E specialists have gathered through years of experience in electrifying all branches of the rock products industry.

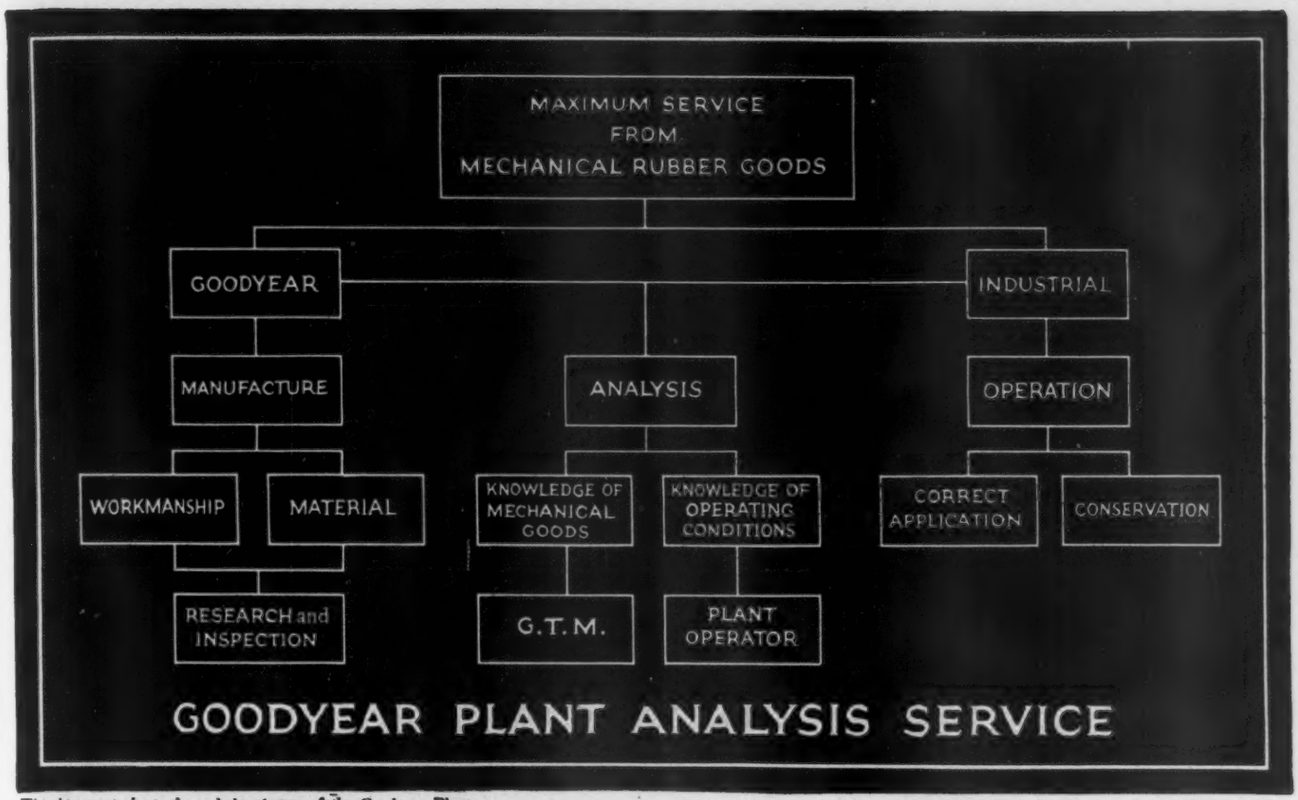


One of the best switchboard installations in any industrial plant. It incorporates the control elements for major power-consuming units as well as the usual distribution panels.

It exemplifies the degree to which safety, adequacy, dependability, simplicity, and good appearance are attained in the control problems of G-E Motorized Power.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES



This blueprint charts the orderly relation of the Goodyear Plant Analysis Plan for maximum service from mechanical rubber goods

The Plant Analysis Plan—and the G. T. M.

This chart is important to every man who has to deal with belting, hose or packing problems. It shows the principal factors in the Goodyear Plant Analysis Plan, and makes clear the part that is played in more efficient, economical plant equipment by the G. T. M.—Goodyear Technical Man.

You know the idea behind the Goodyear Analysis Service. It is simply this, that you are bound to get more work and better work, done more efficiently and more economically, from the *right* mechanical rubber goods, specified to the job. How the *right* product is found by analysis is shown on this blueprint chart.

At the top you see the G. T. M. and your plant operator, each applying his special experience and knowledge to the problem in hand, whether it be a single drive or an entire plant equipment. They make the analysis together.

The G. T. M. is an expert on mechanical rubber goods. He knows their special properties. He is trained in the science of their specification and application. His work takes him into many plants, in many industries, so that he is familiar with most transmission and conveying problems, and is a practical authority on many of them.

When he comes to your plant, he comes as a friendly analyst of your operating problems, your troubles, maybe. He doesn't pretend to know it all. He gladly takes the advice of your superintendent and engineer. He gives close attention to their experienced knowledge of your operating conditions.

His entire purpose is to fit what he knows about belting, hose or packing to the demonstrated conditions of service in your plant. If he can find out what you can use to best advantage, he will recommend it to you. Then, on your order, Goodyear will build your equipment according to those approved specifications. And after it is installed, the G. T. M. will follow it up with a service that will see that you get out of your equipment all the value built into it by this scientific analysis and careful manufacture.

Doesn't it stand to reason that you are likely to get the utmost in trouble-free, long-wearing service out of that kind of equipment? The proof of the Goodyear Analysis Plan is in the records—many of them published in these pages during the past ten years—of better, more productive and more economical work done by G. T. M. specified goods in hundreds of plants, in every line of industry.

There is a G. T. M. in your neighborhood. It may pay you well to have him analyze your needs or problems. If you want to get in touch with him, or receive detailed information about the service Goodyear Mechanical Rubber Goods—belts, hose, valves and packing—are giving in your particular industry, write to Goodyear, Akron, Ohio, or Los Angeles, California.

Goodyear Means Good Wear

VALVES · PACKING BELTS · HOSE

GOODYEAR

making an altitude record

Fifty-two feet above ground—in a steel shaft house—Telsmith No. 1104, a 20-inch Primary Breaker, has been operating successfully for nearly a year at the mine of the Bristol Mining Co., Crystal Falls, Mich.

High altitudes are not new to Telsmith. As far back as 1915 several similar installations were made—including a 12-in primary breaker at the Loretto Iron Co., Loretto, Mich., and a 14-in. machine at the Penn Iron Mining Co., Vulcan, Mich.—but this 20-in. Telsmith at the Bristol shaft is, we believe, the first overhead installation of this capacity ever attempted in the United States.

Why are Telsmith crushers so signally successful in steel structures of considerable height? Simply because of Telsmith's **different design** which embodies all these particular advantages:

(1) economy of height due to short structure and bottom discharge;

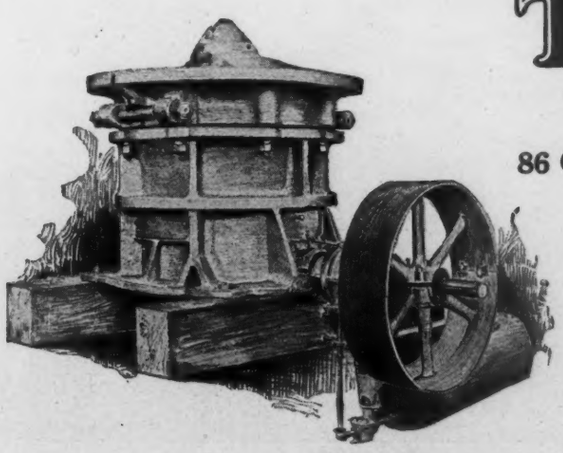
(2) reduced vibration, due to rotation of sleeve eccentric on fixed shaft;

(3) convenience in maintenance—all repairs made from above crusher;

(4) less labor in feeding, due to bigger diameter of crushing bowl and longer initial pinch;

(5) fewer shut-downs due to **steel structure,** enormous bearing areas and automatic lubrication.

The Bristol Mining Co. state that their experience with the Telsmith crusher is entirely satisfactory. The reasons why are told in complete detail in Catalog 166 (Telsmith Primary Breaker) and Bulletin 2F11 (Telsmith Reduction Crusher). **Write for them.**



TELSMITH

SMITH ENGINEERING WORKS

86 Capitol Drive **Milwaukee, Wis.**

Canadian Representative:
Canadian Ingersoll-Rand Co., Montreal, P. Q.

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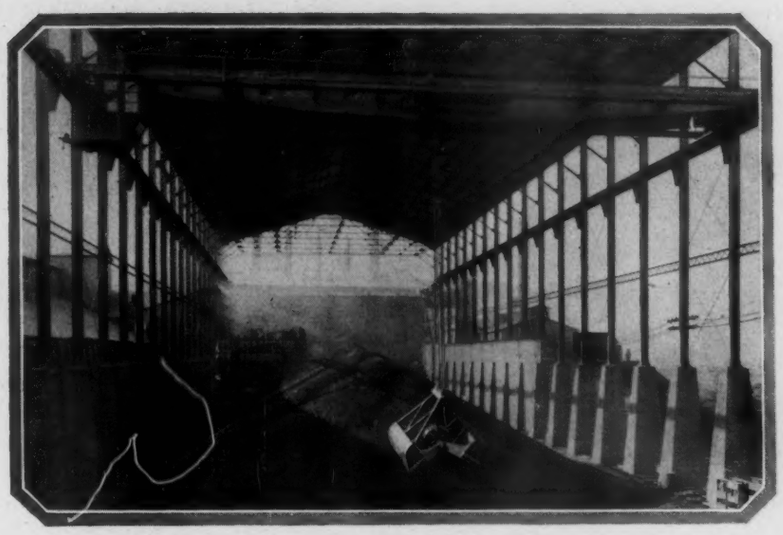
Milburn Mchy. Co. Columbus, O.	Knox Eq. & Eng. Co. Indianapolis, Ind.	Brandeis M. & S. Co. Louisville, Ky.
Borchert-Ingersoll, Inc. St. Paul, Minn.	Bunting H. & M. Co. Kansas City, Mo.	General E. & M. Co. Miami, Fla.

P. B. 24



A clam shell for clinker handling

HERE is a Hayward Class "E" Clam Shell Bucket digging cement clinker, which it handles 3 cu. yds. at a clip. It is serving at the Alpha Portland Cement Co., Alsen, N. J.

Alpha is one of many Hayward users who are well known in the cement and rock products fields. Alpha is one of many users who have learned at first hand what one man and a Hayward can do in the saving of labor and speeding up plant operations.

A Hayward combines digging power with digging speed. Its big bites mean fewer trips to handle any given amount of material.

Let Hayward engineers advise you in the selection of a bucket to fit the job.

THE HAYWARD COMPANY

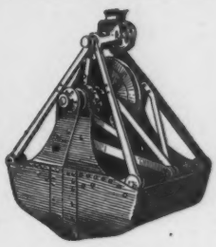
200-204 Fulton Street New York, N. Y.

Builders of Clam Shell Drag Line, Orange Peel and Electric Motor Buckets; Dredging, Excavating, and Coal Handling Machinery; Automatic Take-Up Reels; Counterweight Drums.

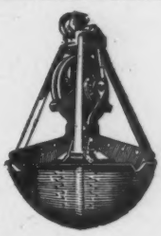
HAYCO

Hayward Buckets

Electric Motor Buckets

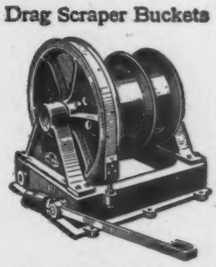


Clam Shell Buckets

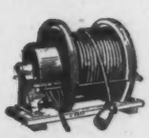


Orange Peel Buckets

Drag Scraper Buckets



Counterweight Drums



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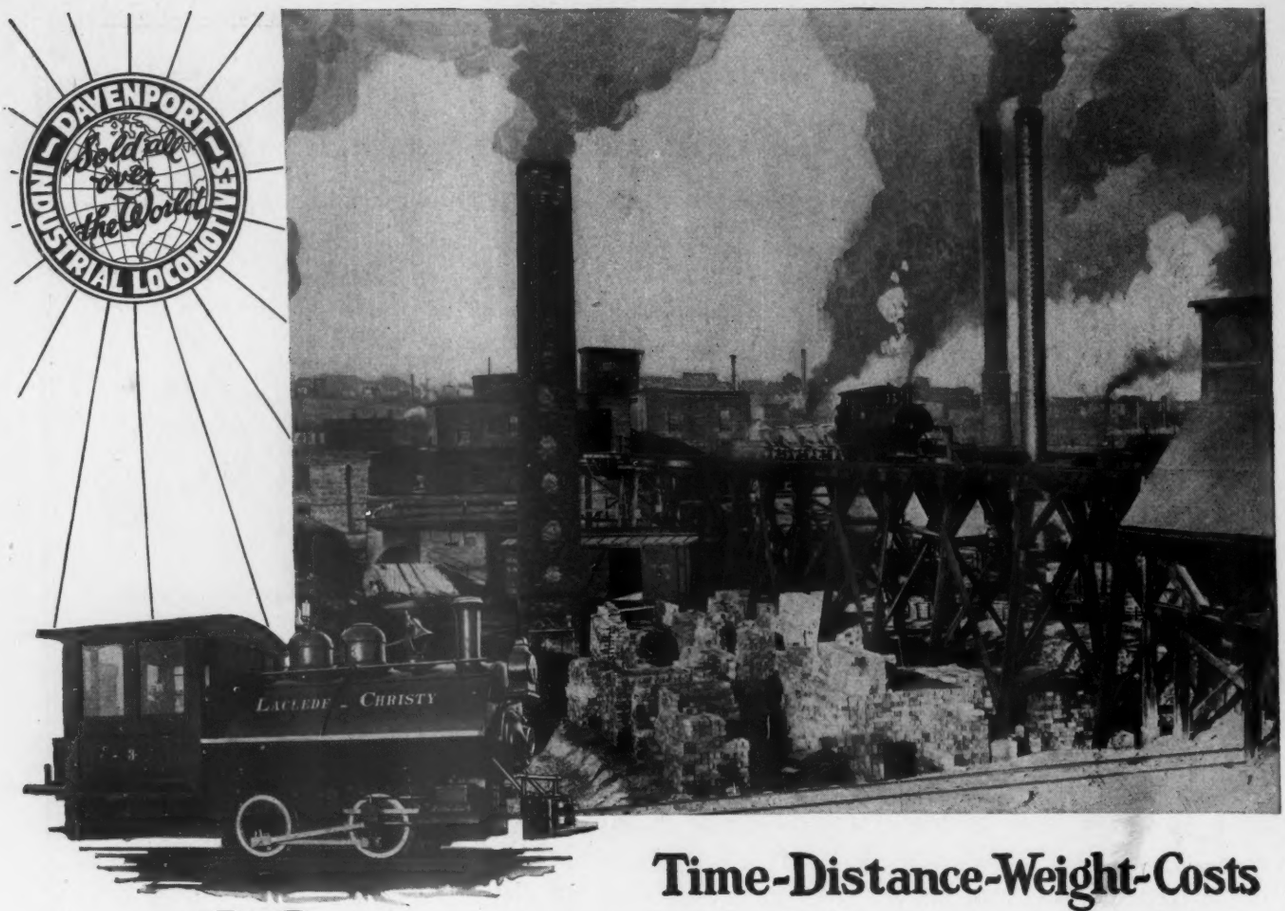

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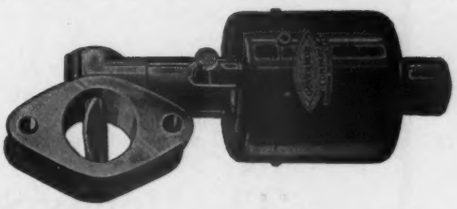

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The Mundy Hoist is a "repeater"—three shots in its magazine—in other words three speeds, and instant line pull with each one, for heavy, intermediate and light loads. No reaving changes are ever necessary! Just shift a lever and keep going.

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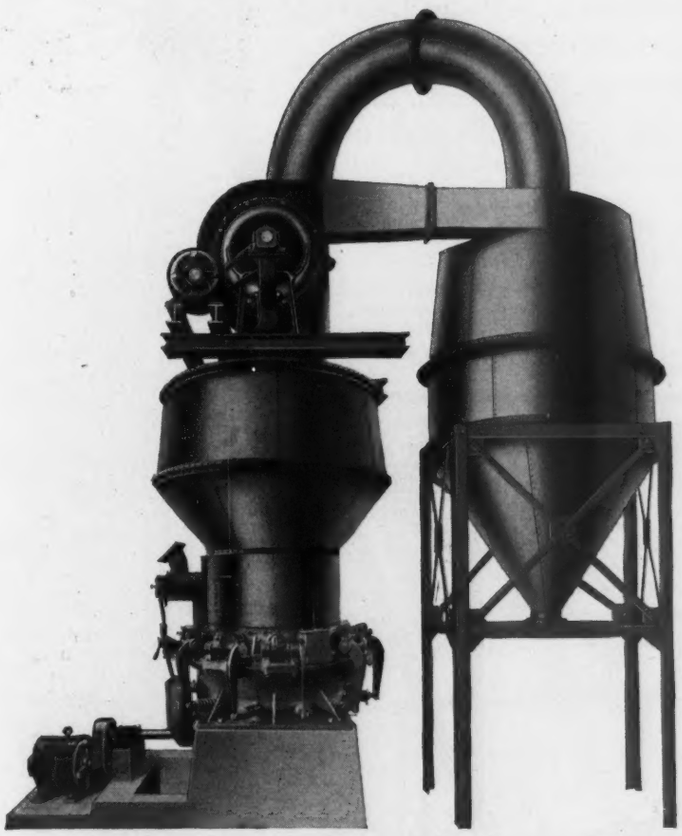

The Bethlehem Pulverizer is dustless and comparatively silent in operation, gives uniform separation at a constant rate of discharge, and delivers the ground product without the use of elevators, conveyors or auxiliary equipment, direct to the storage bins.

The slow operating speed of the Bethlehem Pulverizer eliminates heating and reduces wear on grinding elements to a minimum. Its extremely low power consumption and maintenance cost, compared with its large output, make it a highly economical mill.

We solicit inquiries from anyone who has a fine grinding problem.

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S-A SIMPLEX CARRIERS equipped with 2 TIMKEN BEARINGS in each pulley

Belt conveyor installation for loading sand into boats. View shows the "Simplex" Carriers upon which the belt travels.

It has taken years of experience with thousands of belt conveyor installations to produce "Simplex" Belt Conveyor Carriers.

As shown in the illustration above, each "Simplex" has three rollers which trough the belt for high capacity. Rollers are sturdily built of heavy gauge steel tubing with no sharp edges to wear or fray belt.

Each roller turns on two Timken bearings carried in a large grease reservoir and doubly protected from grit, dirt and moisture by a multiple groove grease seal and a labyrinth washer.

Belt conveyors equipped with "Simplex" Carriers not only require a minimum of power to start and stop, but they also show an actual increase in belt life.

Write for details on "Simplex" Carriers. They are simple, strong and free running.

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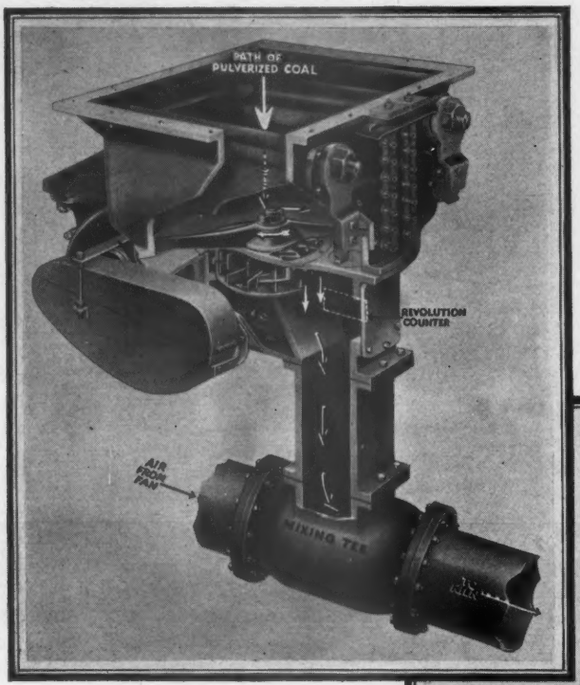
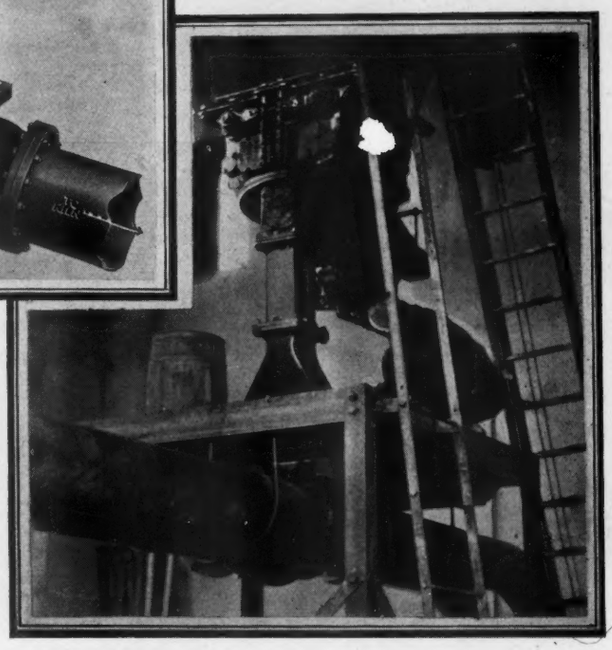
Bailey Coal Feeders for Rotary Kilns





Bailey Pulverized-Coal Feeder for Rotary Kilns. At the right, Bailey Feeders for cement-kiln firing in the plant of the Lawrence Portland Cement Company, Thomaston, Maine.

ROTARY KILNS equipped with Bailey Feeders have never been beaten for high capacity with low fuel consumption. Kiln operators prefer Bailey Feeders because they permit positive control over combustion conditions. Periodic flooding—a condition always present with screw feeders—is impossible. The maintaining of a uniform feed insures an evenly burned cement clinker. This uniformity of feed also enables the feeder, when calibrated, to serve as a meter of high accuracy—within two per cent.

Savings of from 5 to 7 pounds of coal per barrel of clinker burned have been reported with Bailey Feeders. In fact the results obtained have been so eminently satisfactory that over 100 Bailey Feeders are installed and on order for use in cement plants and boiler houses. A number of repeat orders have also been received—one for a duplicate of one of the longest kilns in the world.

WE ask your thorough investigation of the advantages of the Bailey Feeder and of its excellent operating record.

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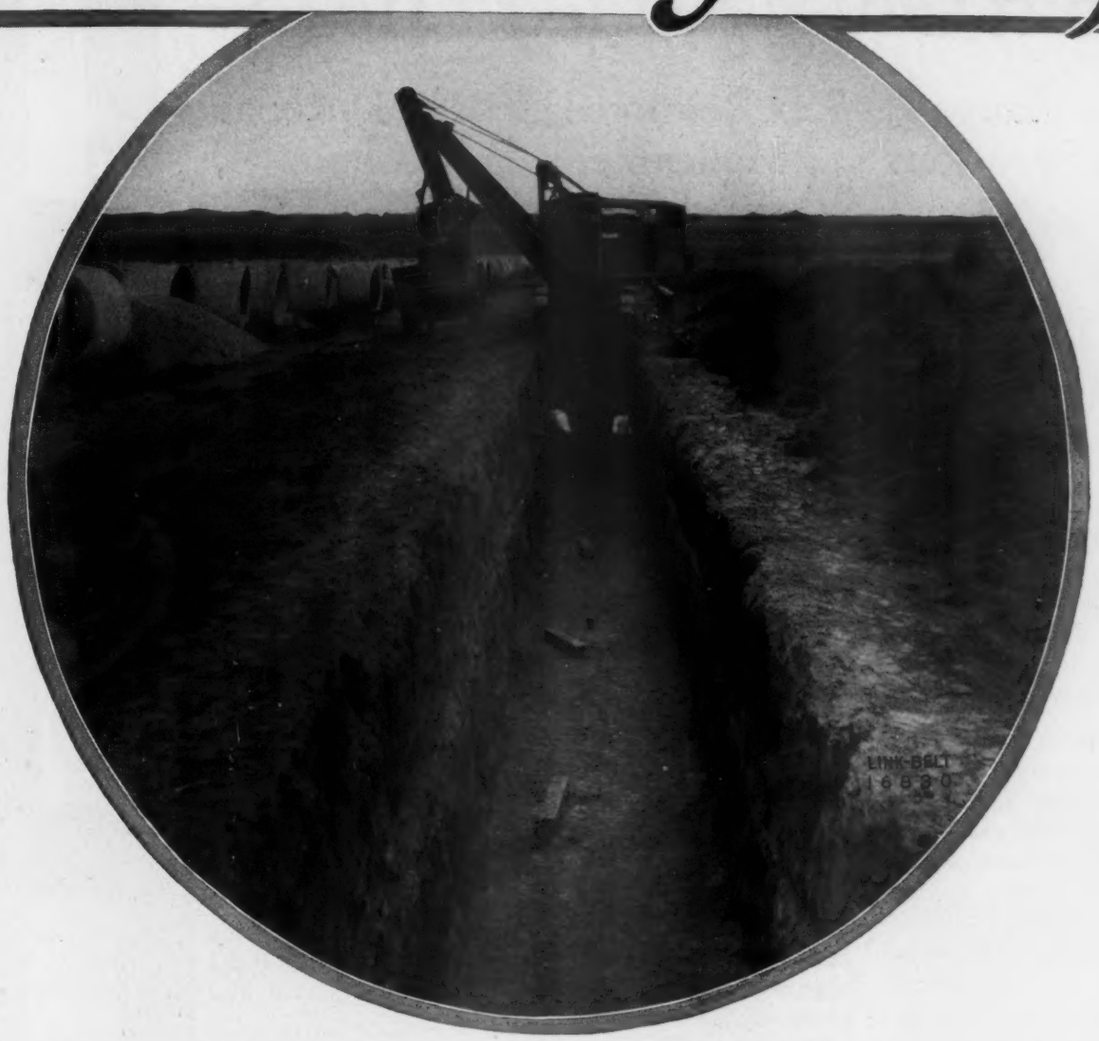

THE performance of the Link-Belt Shovel has earned an enviable nation-wide acceptance by those who excavate and handle material.

To own and operate a Shovel—built and backed by Link-Belt—is to know why the machine has earned and held its place in the estimation of contractors. Ask that the "Shovel News" be sent to you regularly.

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The Added Metal Section that Gives *Added* Life to

Rex Flanged Rim Sprockets

The bead of Rex Flanged Rim Sprockets has been extended in flanges to a width slightly greater than that of the combination chains for which they are built.

In operation, the sidebars of the chains ride on these flanges. The traction of the heavy steel and malleable iron sidebars on the extended flanges carries a considerable part of the load that is otherwise centered on the barrels of the block links and the sprocket teeth.

The result is considerably longer life for both chain and sprockets.

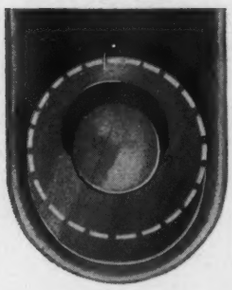
Rex Reinforced Malleable Buckets

In the new Rex reinforced malleable bucket, reinforcing sections are cast at the back where the bucket is bolted to the chain. This makes a stronger bucket for heavy duty elevating, and provides more clearance between the sprocket and the bucket.

The attachments on the chain fit tightly to the reinforcing straps of the bucket, so that there is no opportunity for material to pack between them and force off the bolt heads.

The buckets have a heavier section on scooping side, which also lengthens their life in abrasive material.

Rex Durobar Chain



In Rex Durobar Chain, the added metal is on the outside of the barrel of the block link, so placed that only the rear barrel of the links comes in contact with the sprocket tooth.

In the action of ordinary combination chain, it is the forward barrel that grinds. The added metal in Rex Durobar ends the bad sprocket action, present in all other types of combination chain. As a result it adds greatly to the life of both chain and sprocket.

Rex Durobar has also the relieved and lubricated barrel that ends sticking and freezing of the pins.

We have a new folder ready to send to anyone interested in Rex Flanged Sprockets, Reinforced Malleable Buckets and Rex Durobar Chain. Write for your copy today.

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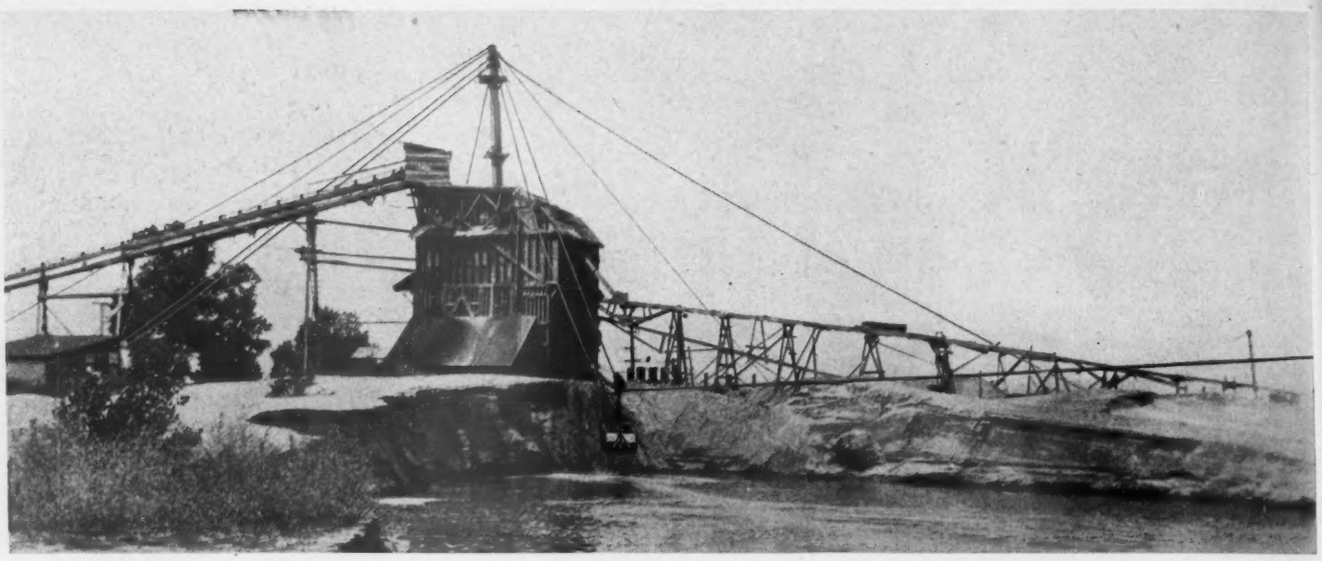
Volume XXXI Chicago, June 9, 1928 Number 12

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

The Gordon Sand and Gravel Co. plant at Clear Creek, Colo., showing the cableway delivering gravel to the top of the plant and the reclaiming scraper taking material from the stock pile to the ground hopper



Clear Creek plant of the Gordon Sand and Gravel Co., showing method of taking material from wet pit

Two Modern Dragline Plants

Gordon Sand and Gravel Co., of Denver Operates Separate Plants for Sand and Gravel

By Jos. C. Coyle
Denver, Colorado

THE GORDON SAND AND GRAVEL CO., of Denver, Colo., was organized two years ago for producing aggregates to be used in the contracting operations of the Gordon Construction Co. It has now outgrown the parent company and is operating two of the largest and most modern gravel plants in the state of Colorado, and these plants furnish aggregates for truck delivery to all part of Denver and its suburbs. One of them is located on the Platte river, just below its junction with Cherry creek, and furnishes four grades of sand and two grades of pea gravel. The other, on Clear creek, a short distance from the city limits, produces three grades of gravel and one of sand. By the establishments of plants in different locations the company has provided a supply of any kind of aggregate likely to be desired in construction work. An interesting feature of one of these plants is the recovery of gold as a by-product.

All Material Passes Through the Scrubber

Both plants are supplied by wet pits, and the equipment was carefully selected for the efficient and economical production of aggregates. At the gravel plant, equipment has been installed which turns out an unusually clean, high-grade gravel, as may be seen from the accompanying picture of the stock pile. According to Mr. Jones, manager of the plants, this is due in great measure to the scrubber and scalping screen devised for the plant by Mr. Gordon. This cylindrical scrubber is 8 ft. long, and revolves on a tire and four rollers. In the back end there is an opening 16 in. in diameter, leading into a goose neck which goes into the hopper at the top of the plant. In this opening a steel gate, operated from the front end of the screen by a long rod, is adjusted to control the flow of gravel, according to the nature of the feed.

In passing over the first 5 ft. of the scrubber the material is washed by a 2-in. stream of water under pressure, being held back and buffeted about by a series of steel balks, several inches in height, which are riveted to the sides of the scrubber in alternating positions. These balks, or "elephants' ears," as they are termed, insure thorough washing of the gravel by turning it over and over as the stream plays upon it. In the remaining 3 ft., 2½-in. perforations allow sand and gravel to pass through to the outer jacket of the screen, which is of ¼-in. mesh. Here 90% of the sand is removed from the gravel by the water, passing through the outer jacket into a pan, from which a 10-in. pipe leads to the waste flume, while the coarser aggregates pour over the end of the screen into the sizing screen below. The larger stones, which failed to pass through the 2½-in. perforations, flow over the end of the screen into a crusher. Beneath the scrubber is a chute which may be adjusted to direct the flow of gravel into the washed pit run bin.

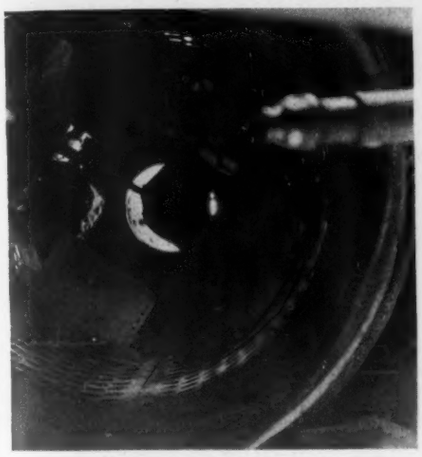
The sizing screen, 26 ft. in length and of Austin make, also has streams of water playing upon the gravel as it goes through into the loading bins or through chutes to the ground. In the latter case the gravel is carried to storage pile and reclaimed by a ¾-yd. Sauerman drag scraper. A bucket elevator carries it up to the loading bins when it is reclaimed.

Material from Wet Pits

The bank material is obtained from two wet pits near the plant. One is worked by a 900-ft. Sauerman slack line cableway excavator with a three-speed hoist of the same make which operates to a depth of 25 ft. or more, dumping into the hopper at the top of the plant. The other pit, which is 100x400 ft., is worked with a 2-yd. drag scraper and a Thomas hoist. This scraper digs the gravel from a depth of 25 ft. or more and carries it to a belt conveyor which delivers it to the hopper near the top of the screening plant. Each unit of the plant is operated by a separate motor. The capacity of the plant is 60 cu. yd. of finished material per hour.

The presence of a large amount of waste sand in the Clear creek deposit (about 60%) has deterred many gravel producers from locating there, but with the equipment used by the Gordon company no trouble was found in making the plant a profitable investment. A unique feature of the plant, which has considerably lowered the cost of removing the waste material from the gravel at this plant, is the installation of strips of carpet in the flume which carries the waste to the dump. Gravel and sand of the creek carry values of about 5c per cu. yd. in flour gold, and this is collected by the carpet in the flume and worked off at intervals.

The sand plant of the company, on the Platte river, occupies a strategic position, as it is not far from the business section of the city. It draws its supply of sand from the bed of the river. While the sands of the Platte are too coarse for general use, the location of the plant, just below the mouth of Cherry creek, brings the fine sand of the latter stream into the pit, resulting in an ideal mixture for general purposes. The recent installation of a 5-mesh Bartlett and Snow screen makes available a finer sand than heretofore, for plastering purposes. Concrete sand is the product for which there is the most demand at this plant. This is stored by means of an 18-in. belt conveyor, on a trestle, and is reclaimed into two 20-yd. steel loading bins, as needed, by a similar belt running into a tunnel beneath the storage pile. This pile holds 15,000 yd. of sand.



Scrubber and scalping screen at the Clear Creek plant

Clear Creek plant with cableway conveying material to the top of the plant

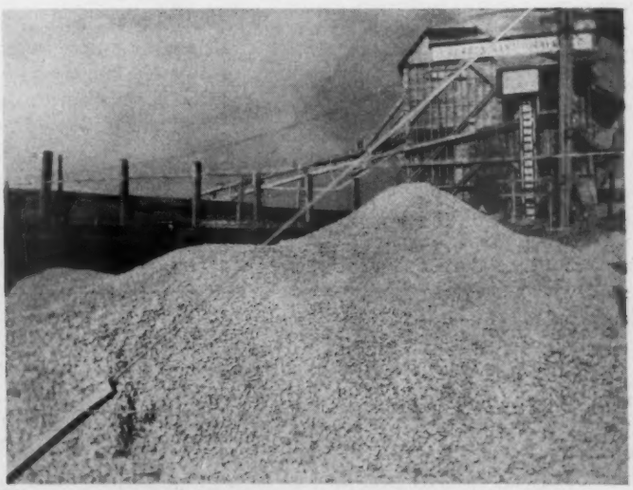
One Plant Uses River Sand

Sand is dipped from the bed of the river and conveyed to the hopper at the top of the washing plant by a 1½-yd. Sauerman slack line excavator, with a Sauerman two-speed hoist. An ample supply of water, pumped to the top of the plant, washes all waste material from the sand and carries it back to the river below the plant, through an elevated sluiceway. Two dewatering wheels remove the surplus water from the sand after it passes through the sizing screens.

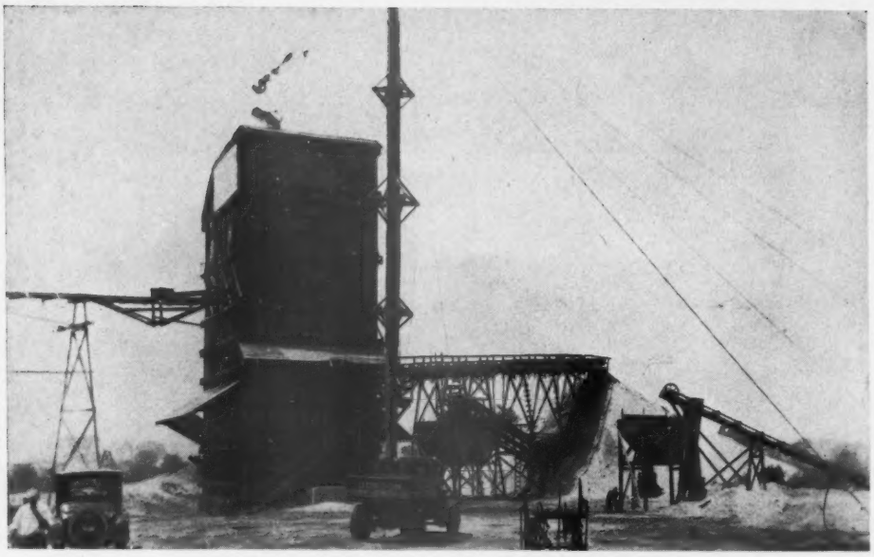
Scraper stocking the storage at the Clear Creek plant

The recent construction by the company of a new office building at this plant, and a concrete garage, 70x80 ft., in which all trucks will be stored and repairs made, is expected to effect a considerable saving in time and money. It places all trucks of the company at the plant every night and morning, whereas it was formerly necessary to drive them from an uptown garage, a mile away, every morning and return them there every evening. Then, too, it will be possible to make repairs whenever needed, getting the trucks right back into service instead of having to wait for garage men to make the repairs. All repair work except machining will be done in the garage by the company's own drivers. These men are usually good mechanics and are selected according to their ability to take care of their trucks and the interests of the company in general. No particular rules are laid down for them, except that they must be courteous to the public and handle the trucks as if the latter belonged to them individually. Four 6-yd. Mack trucks and four 5-yd. White

Storage and loading facilities for concrete sand at the Platte River plant



Storage pile of well-graded and worked gravel at the gravel plant



Platte River plant of the Gordon company

trucks are used for all delivery purposes.

All trucks are painted with a particularly good grade of enamel, intended to resist erosion by sand and gravel. The chassis are yellow and the bodies a pea green, except for a triangular section of yellow at each side of the rear end. This peculiar design makes for visibility and leaves a permanent impression of the company's colors in the minds of all who observe the trucks on the streets.

The Banmor, India, Cement Mill

THE MODERN cement mill at Banmor, India, was built by the Gwalior Cement Co., Ltd., in 1924. Its present capacity is about 220,000 bbl. per year, which can be doubled by installing the necessary equipment, provision in the plant design allowing for this.

The raw materials are argillaceous limestones, high calcium limestone and clay, the composition of the blended limestones being very close to a normal portland cement mix, so very little clay is needed for adjustment. The stone is hauled in on 16-ton cars and dumped directly to the primary gyratory crusher, where it is reduced to 3-in. and then carried to storage hoppers. The hoppers hold about 100 tons each of the two limestones; from these the respective proportions of limestone are withdrawn and passed to a double-roll mill for reduction to 1-in. size. From the rolls the mixed limestones together with a regulation proportion of clay slurry and water are sent to the 3-compartment raw grinding mill.

The plant has the usual types of slurry correction silos and storage basin. The slurry leaving the tube mill is chemically tested at frequent intervals, and the proportions of semi-pure and argillaceous limestones adjusted at the feed tables together with the proportion of clay to give the desired approximate chemical composition of the slurry, and the final adjustment is made in the correcting silos, the slurry in which is rapidly agitated by compressed air supplied by an adjoining air compressor. Above the correcting silos is a small graduated "clay slurry" tank from which requisite quantities of clay can be run into the correction silos until the desired composition of slurry is obtained. In operation one silo is being filled, a second is being corrected while the contents of the third, after having been passed as correct by the works chemist, is run from the silo by gravity into a 63-ft. diameter circular storage basin which will contain about 1200 tons of slurry, enough for several days operation of the rotary kiln. The slurry in this storage basin is kept in a continual state of agitation by a mechanical mixing device with four sets of agitators.

The single rotary kiln at the plant is 175 ft. long by 7 ft. 6 in. in diameter at the feed end, enlarged to 8 ft. 6 in. at the burning zone. It is rotated by a set of gears and variable speed electric motor. The fuel is pulverized coal, pre-dried before pulverizing by the waste heat from the kiln. Clinker is passed to a rotary cooler 55 ft. long by 4 ft. 7 in. in diameter, where it is cooled by a counter-flow cold air blast. The heat recovered from the clinker is partly used to dry the coal and partly returned to the kiln.

From the cooler the clinker drops to an automatic weighing machine discharging to a shaking conveyor which carries it to another conveyor running to storage where it is withdrawn as needed. Gypsum is added to retard the set. Finish grinding is carried on in a 3-compartment mill driven by a 300-hp. synchronous motor with magnetic clutch. The mill is equipped with a dust collector.

There is one storage silo for finished cement holding about 20,000 bbl. and another of similar capacity is under construction. The packhouse has the usual packers; the sacks as packed hold 112 lb.

All the cement mill equipment was furnished by the F. L. Smidth Co., who also designed the plant.

All the machinery is driven by electric motors, the majority of which are direct connected through suitable steel reduction gears and flexible couplings to the various machines. Motors drive the stone crushers and crushing rolls through "Lenix" belts, while two synchronous motors, each of 300-hp., drive the raw material and cement grinding "Unidan" tube mills respectively through magnetic clutches connected to the mill pinion shafts. A 150-hp. synchronous motor similarly drives the coal grinding tube mill.

The electric motors were supplied by the International General Electric Co. of Schenectady, U. S. A., the majority being of their manufacture and a few were obtained from their associates, the British Thomson Houston Co., Ltd., of Rugby, England. Power is obtained from two steam turbo-alternators each of 1000-kw. capacity; one unit being capable of supplying all the electric energy required to drive the existing cement-making plant, the second unit having been installed as a "standby" and later for permanent use when the cement plant is duplicated.

The steam turbines are of the Curtis impulse high pressure type with a speed of 3000 r.p.m., the alternators being connected to the horizontal shafts of the turbines by flexible couplings. The alternator gives 1000 kw. per hr. at 440 v., 50-cycle, 3-phase.

The turbo-alternators, surface condensers, pumps and accessories together with switchboard and control gear were supplied by the British Thomson Houston Co., Ltd., of Rugby, England.

Steam for the turbines is obtained from two Babcock and Wilcox water tube boilers, each having 5370 sq. ft. of heating surface complete with mechanical chain grate stokers, Green economizers, integral superheater and self-supporting steel chimney. Steam is superheated to 200 deg. F. and supplied to the turbines at a gage pressure of 200 lb. per sq. in.

Each boiler is capable of separately supplying steam sufficient for the full output of one steam turbo-alternator.—*The Indian Concrete Journal.*

Egypt Buying Cement

LACK of stones and lumber combined with plentiful supply of sand and gravel has increased Egypt's need for cement, and imports show steady and rather rapid growth. Most of it is bought in Jugo-Slavia, Belgium, Germany, the United Kingdom and France. Underground cellars, heretofore impractical because of the damp climate, have been made satisfactory by cement and waterproofing materials.—*Tampa* (Fla.) *Tribune.*

Making Highways of Sand-Gravel

A New Road Material That Is Using Sand and Pea Gravel in Large Quantities

By Edmund Shaw
Editor, Rock Products

SAND AND GRAVEL and road surfacing on heavy soils have been used since "the memory of man runneth not to the contrary." Under modern traffic they have failed, when applied in the old fashioned way. The sand-gravel road, however, is something new and it is standing up well under traffic that would cut the ordinary gravel road or sand-clay road to ribbons. Moreover, it has opened a great new source of business to the sand plants of the trans-Mississippi states. And finally it promises to make a market for excess pea gravel in such states as Illinois and Indiana.

This type of road seems to have been developed in Nebraska, where there are stretches that have been in use for two or three years, and even longer. Its use spread south and last year it was scientifically promoted in Kansas by the Consumers Sand Co. of Topeka. The success was such that now this company, which operates many plants, cannot produce any more than the market demands.

In promoting this road the company secured the services of W. T. Hole, who was, at the time, maintenance engineer for the Kansas State Highway Department. Mr. Hole has had ten years' experience in highway engineering, first in Nebraska, afterward in Missouri and finally in Kansas. They call him the daddy of the sand-gravel road in Kansas, but Mr. Hole disclaims the honor. He said that all he has done for it is to apply the methods worked out in Nebraska with some changes that perhaps enable the material to be used more economically than was the case in earlier construction.

Sand-gravel may be considered as a very coarse sand or a mixture of sand and pea gravel. It has a fineness modulus of 3.75 to 5.00 (they call this a "grading factor" in Kansas) and contains from 26 to 28% voids.

ORDINARILY we are not interested in types of highway surfacing, for all types offer outlets for one or more rock products, and any type of improvement is preferable to none at all. In this case, however, we are interested, and every sand and gravel producer should be interested, because the sand-gravel road as built now in Kansas and Nebraska was developed very largely by the sand and gravel producers themselves to provide a market for otherwise waste material.

In other words, sand-gravel road construction is a direct result of applying brains and research to the marketing problems of ordinary sand and gravel—a line of application capable of tremendous development in this country through the consolidated, or co-operative, efforts of producers.—The Editor.

Mr. Hole says that in his opinion a grading factor of 5.00, which the state permits, is too high, and that the best results are with a grading factor from 3.75 to 4.00.

Best Suited to Heavy Clay Soils

The other essential for the road is a stiff clay soil, the stiffer the better. This type of road cannot well be made on a sandy soil subgrade. But, as it is the stiff clay soils of the prairie states that have presented the greatest difficulty in road making, the limitation is not so important.

The whole trick of applying the sand-gravel is to put it on in very thin layers while the surface is smooth and dry. The traffic then rolls it into the clay. As fast as the road will take it more thin layers are put on. The result, after sufficient applications have been made, is a crust from 1½-in. to 3-in. deep that looks like some types of bituminous road surfacing and has the same riding qualities. It is almost dustless, and the only reason it is not entirely dustless is because the newly applied surfacing carries a little dirt that is released as dust before it is beaten down into the grade.

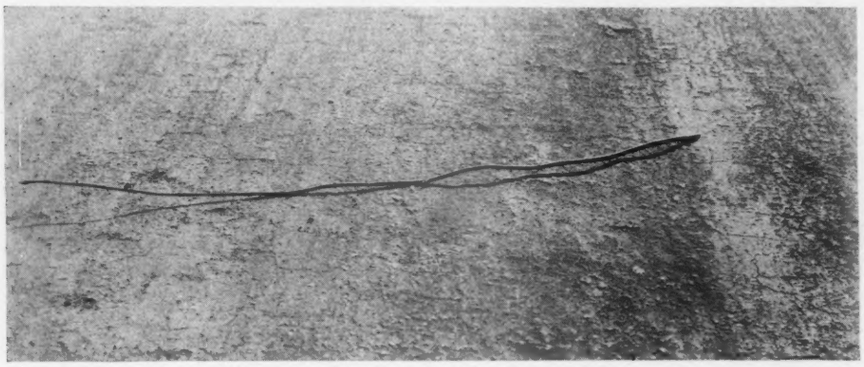
The writer was taken by Mr. Hole over 16 miles of this road, a part of it being on the highway from Topeka through Holton, Kan., that is traveled daily by heavy buses. The pictures were taken on this stretch. As a test a heavy car which belonged to a friend of Mr. Hole was stopped and asked to drive at a speed of 60 miles an hour. There was only a very little dust, which came from newly spread material, and the road showed no marks. In fact, the surface was so hard that it was difficult to dig into it with a pocket knife, about as difficult as it is to dig into a well-made macadam road. The maintenance man was interviewed and said that the traffic at that time was running at 1000 vehicles a day, but it had been a great deal heavier, especially in the week of the state fair, when it carried an almost continuous stream of vehicles. In his opinion this type of road would stand up just

A stretch of sand-gravel road near Holton, Kan. The car is approaching at 60 miles an hour

Mr. Hole standing on the windrow beside the road to show the depth for application of 400 cu. yd. to the mile

as well under 2000 vehicles a day. The bus driver gave his evidence as to the good quality of the road and said that he had never had to put on chains after the second application of sand gravel had been made.

This road is of the type that requires constant maintenance and the cost is about $400 per mile per year. The patrolman goes over six miles every other day. He uses a bladed grader, set so that it just cuts into a win-



Showing texture of the road. The switch is about 1/2 in. in diameter at the large end

drow of sand-gravel which is placed beside the road. He draws out only enough material to make a coating about ¼-in. deep, or about one grain deep for the larger size grains. And he does not apply more until the traffic has worked this into the crust.

Construction Method

In putting on the first applications the grader may be followed by a plank drag that pounds the sand-gravel into the surface, but the traffic is sufficient to work in the later applications. After a few applications the surface is waterproof and maintenance can go on in wet weather as well as in dry weather.

Mr. Hole says that the success of this type of road depends upon: (1) method of application; (2) grading of the material and (3) quality applied. These are given in the order of their importance. The method of application, thin coatings applied only as fast as the surface will take up the material, has already been explained. As to the grading, Mr. Hole says that this is just as important as it is in a concrete aggregate or in a bituminous mixture, and the results are better the nearer the grading approaches the standard The quantity applied is not so important, except that the road must get enough material and not too much. He thinks from 400 to 600 cu. yd. per mile is about right to build the road, although 800 cu. yd. is used in Nebraska.

Preparation of the Material

The material is made by a method which seems to have been worked out by Nebraska producers in the first place. The mixed coarse and fine sand is pumped from a river bed to a shore plant. The pump discharges against a heavy wire screen with 1½-in. square meshes set at an incline of 60 deg. from the horizontal, which is principally to keep out trash. The material is then spread out on a fanning table, 18 ft. wide, from which it flows over a 14-mesh screen. Ordinary fly-screen cloth has been found to give the best results. The screen is tacked on a frame 9x3 ft., and it is set at an incline of 45 deg. The oversize, which is sand-gravel, is practically dry and is settled in a bin from which it is loaded into railroad cars. Pipes from the upper part of the bin can run the material to ground storage, from which it is later recovered by a locomotive crane.

The undersize, minus 14-mesh, is largely returned to the river, but as much as can be sold is recovered by taking out a part of the stream through a spout that delivers into a settling bin. The overflow from this bin is sent to waste.

The same screen may be used to make concrete sand by laying a board over the upper part of it to reduce the screening area. This throws more fines into the product. The wider the board the more fines are included, so the grading of the concrete sand can be pretty well controlled. But in making road sand-gravel there is no way to control the grading without using wider screens.

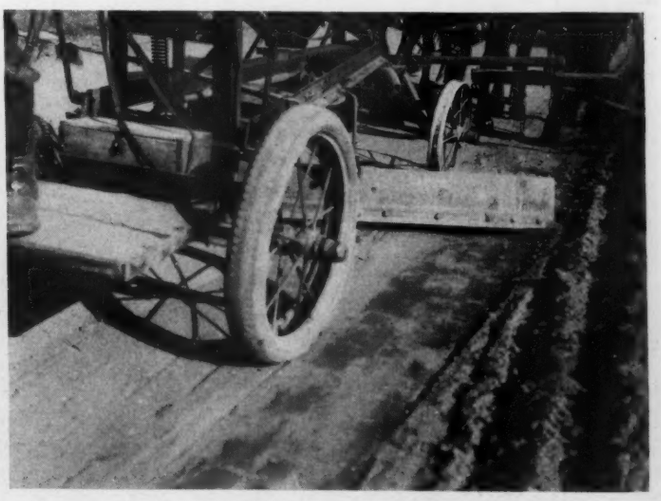
W. T. Hole

An average grading of sand-gravel for road purposes is about as follows:

Retained on	%	Cumulative %
⅜-in.	2	2
4-mesh	8	10
8-mesh	25	35
14-mesh	30	65
28-mesh	23	88
48-mesh	10	98
100-mesh	2	100

All the material has to pass a ¾-in. mesh. The grading factor of the above (fineness modulus) is 3.93, which is about the average for the production of this company. Such

The grader taking material from the windrow at the roadside



Showing the small amount of material taken by grader blade

(Construction methods of sand-gravel road illustrated)

material will contain approximately 28% voids in the dry rodded state. An easy method of testing it, as it is made, is to find the percentage retained on the 28-mesh screen, for if this is about 87% the remaining sizes will be in the right proportion.

The percentage which can be made varies naturally with the material afforded by the river bed. On the Blue river the Consumers company has a plant that yields 60% of sand-gravel out of all the material pumped. On the Kaw and the Arkansas rivers the yield is from 20% to 30%. This low yield cuts down the plant production as compared with concrete sand, as a plant which would produce 40 cars of concrete sand on these rivers would produce only 10 to 12 cars of sand-gravel. So sand-gravel has to be sold at a somewhat higher price.

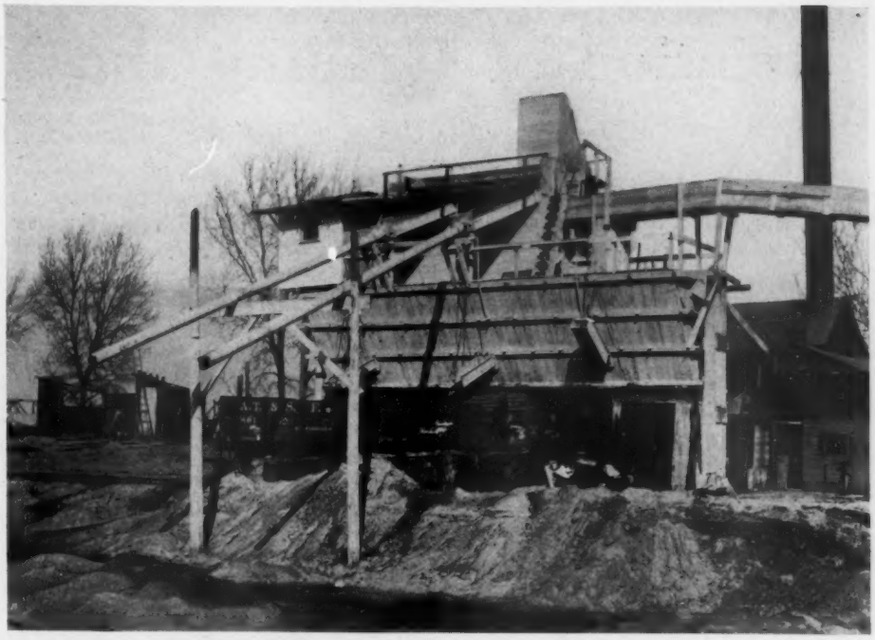
The Stewart Sand Co. of Kansas City, Mo., has made some sand-gravel by hydraulic separation, using the classifiers designed at the plant and described in the issue of Rock Products, May 29, 1926. This method does away with the cost of screens and gives a better control over the grading of the product, but it has an additional cost for pumping the water required to make the separation. As the screen used lasts only for the loading of a few cars, the difference in cost for the two methods cannot be much. Following are the screen analyses of three samples showing how the classification may be changed to vary the product:

Retained on	No.1 Cumulative %	No. 2 Cumulative %	No. 3 Cumulative %
4-mesh	4	10	20
6-mesh	13	25	41
8-mesh	28	44	60
14-mesh	45	62	77
20-mesh	78	86	95
28-mesh	89	94	98
48-mesh	97	99	100
Fineness modulus	3.81	4.22	4.66

The fineness modulus or grading factor of the first sample is 3.81, of the second 4.22 and of the third 4.66. The second and third samples are of material much coarser than would be needed for road purposes.

Experiments are expected to be tried out in Oklahoma, where there is excess pea gravel produced with the Grand river gravels, in making a sand-gravel by mixing it with the proper proportion of sand. This does not require that the two shall be mixed before they are put on the road. If a 1 to 3 mix is needed for the proper grading, one truck load of pea gravel and two of sand may be dumped to form the windrow on the side of the road from which the grader takes the material.

The cost of a sand-gravel road in Kansas is about $1200 per mile, the greater part of which is for material delivered to the roadside. This presupposes that a clay-dirt road in good condition is available for the subgrade. If the experience of the next two or three years is as satisfactory as it has been in the past year or two, the use of this material will open up a broad market for the many miles of secondary roads, including county and township roads, that are near to the sand plants of the prairie states.



Plant of the Consumers Sand Co., Topeka, producing sand-gravel for roads

Flotation of High-Silica Bauxite

LABORATORY flotation tests on high-silica bauxites made by the United States Bureau of Mines, Department of Commerce, at its Southern Experiment Station, Tuscaloosa, Ala., have given results which compare favorably with results of earlier fractionations made by means of heavy solutions. Indications are that the laboratory flotation machine can be depended on to give a good separation between the clay and the bauxite provided that these two constituents have been sufficiently liberated from each other by crushing, and provided that the crushing has not produced an excessive amount of slimes. The principal reagents used consist of sodium sulphide and oleic acid. Recent tests indicate that only a comparatively small amount of these reagents is required for the flotation of the hydrous aluminum oxide minerals. One sample of bauxite recently experimented with showed that an amount of sodium sulphide equivalent to 5 lb. per ton of ore was sufficient to give a well sulphidized pulp. Flotation tests of high-silica bauxite are now being made in 500-gram machines and it is hoped that it will be possible to duplicate the results that have already been obtained with a 50-gram machine.

Screen box for receiving pump discharge and fanning table

Blue Diamond Art Plaster

THE Stewart Sand Co., Kansas City, Mo., has placed on the market a colored plaster which it prepares in its "Blue Diamond" mixed mortar plant. It is delivered to the job in steel cans ready for the plasterer's board. The company's literature states:

"The basis of our material is aged lime putty gaged with Keene's cement. All experienced plasterers will recognize in these materials the highest degree of workability and cementing power. The color materials used are mineral pigments and their permanency is absolute. They are accurately proportioned and machine mixed with other ingredients, assuring uniformity at all times.

"All of the attractive textures and delicate color effects which are in such popular demand are readily obtained. Sand-floated textures are uniformly sanded when made with this material; a quality which is often lacking in dry mixed plasters."

Relation of Grading and Voids in Sand

Describing the Use of a Tri-Axial Diagram for Sand Analysis

ONE of the most interesting papers read at the Asphalt Conference in Atlanta was by Prevost Hubbard, engineer, and F. C. Field, chemist, of the association. It covered the whole subject of valuing sand for asphalt paving, but the portion of greatest interest to producers has to do with the relation between the percentage of voids and the grading of the sand. Mr. Hubbard notes in

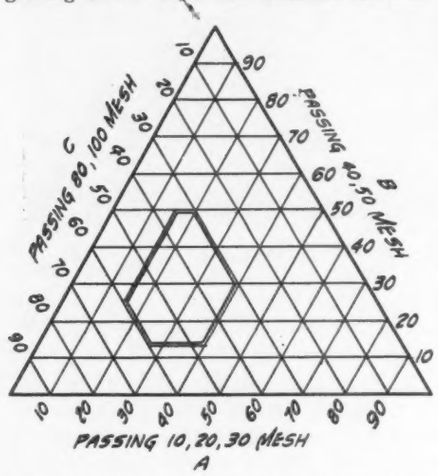


Fig. 1. Three-component sand grading

the early part of the paper that the "kerosene method" was used to determine voids. The paper goes on to say:

If an asphalt sand is separated by means of sieves into three groups each composed of different sized grains and the weight percentage of each group is ascertained, the mesh composition of the sand may be plotted as a single point on a triaxial diagram. Fig. 1 shows such a diagram. The small enclosed six-sided area is bounded by lines representing customary specification limits for the mesh composition of sheet asphalt sands. In starting the grading-void study a large sample of sand widely used in New York and vicinity was first separated into the three groups shown on the diagram, Group A, coarse, passing the 10- and retained on the 40-mesh sieve; Group B, intermediate, passing the 40- and retained on 80-mesh sieve, and Group C, fine, passing the 80- and retained on the 200-mesh sieve. Portions of these groups were next combined to produce 22 samples of different grading.

The percentage of voids in each of these sands was next determined and from the results obtained it was found possible to develop lines or contours, each line indicating roughly a given percentage of voids. Such contours are shown in Fig. 2. Here it is seen that the lowest percentage of voids was found to exist in a small area representing a sand composed of about 75% coarse particles, little or no intermediate particles, and about 25% of fine particles. The curved lines representing higher voids are roughly

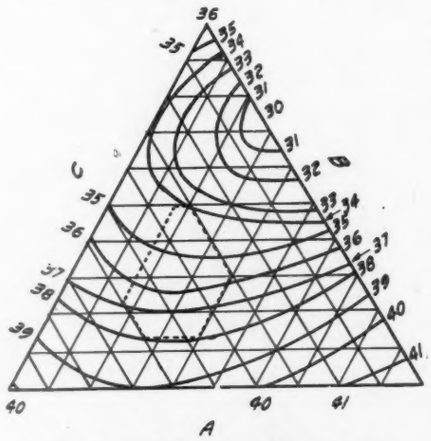


Fig. 2. Relation of voids to three-component sand grading

concentric with the low void area, the highest percentage of voids being found in sands composed entirely of fine particles or entirely of intermediate particles.

It may be noted that the general relations here shown are very similar to those developed as early as 1892 by Feret, who adopted a somewhat different grouping of sand grains for use with the triaxial diagram. The same

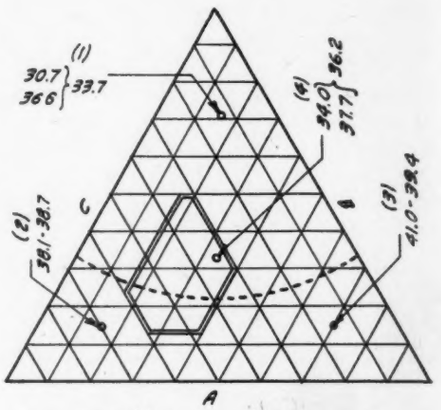


Fig. 3. Effect of intermediate grading on voids in sand

general relations have also been developed in recent independent work, not yet published, by Emmons, who adopted the same group subdivisions but worked with a sand of entirely different origin. It should be noted that the mesh composition producing the lowest voids is seldom if ever met by a single natural sand, and that when this grading is artificially created the absence of intermediate particles creates a tendency toward segregation and therefore a lack of uniformity.

The relations so far established on the

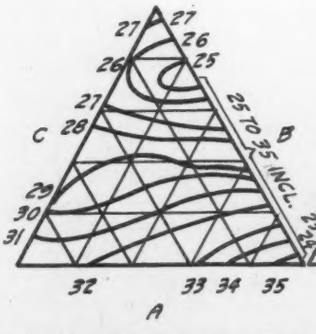


Fig. 4A. Relation of voids to three-component sand gradings plus 20% commercial filler

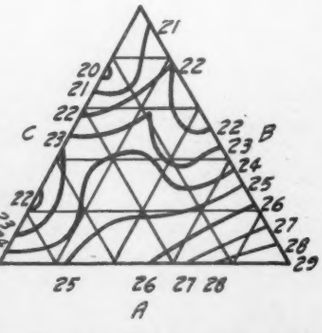


Fig. 4B. Relation of voids to three-component sand gradings plus 40% commercial filler

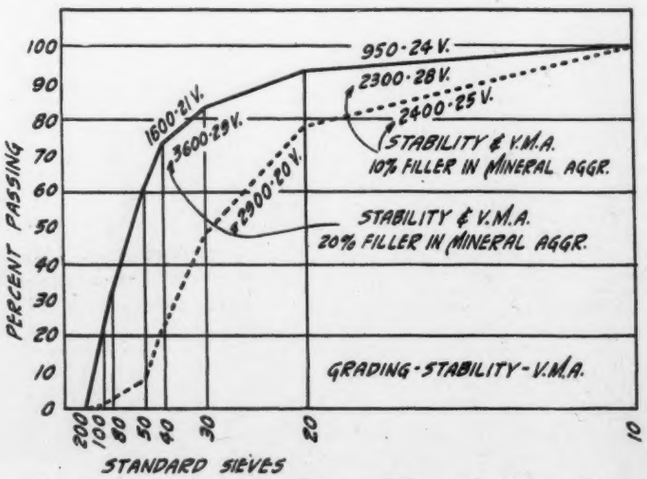


Fig. 6. Comparison of grading, stability and voids in the mineral aggregate

basis of group grading were obtained on sands in which the composition of each of the three groups remained a constant, but what effect will variations in grading within any one or all three of the groups produce on the voids in the sand? Some idea regarding this subject may be obtained from Fig. 3, in which four sands of definite group gradings are plotted. The figures near each point show percentage of voids as affected by variations in intermediate gradings. In the coarse sand (1) a variation of nearly 6% of voids has been produced by varying the intermediate grading of the Group A. Only small differences in voids have been produced by varying the intermediate gradings in the uniformly medium and fine sands (2)

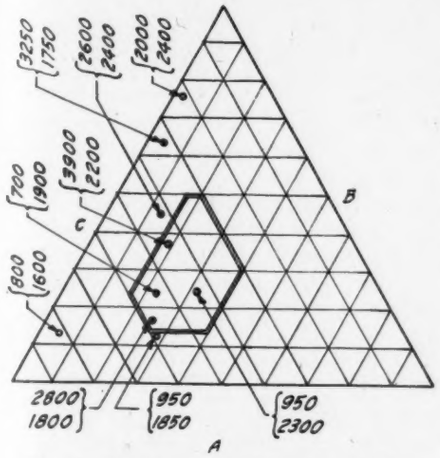


Fig. 5. Relation of stability to grading

and (3), but a difference of nearly 4% voids has been developed by varying the intermediate grading of a centrally located sand coming within the specification area. Moreover, it will be noted that while the lowest percentage of voids has been developed by a certain combination in sand (1) a variation in intermediate grading has produced a higher percentage of voids than that shown by a certain combination in sand (4). This then upsets the general deductions drawn from the preceding figure, except for cases in which the comparison is made between sands in which the mesh composition of each group remains a constant.

The effect of adding mineral filler was then studied and it was shown that even where such constants maintain, the general deductions regarding relation of voids to mesh composition of the sand may be radically altered when the sands are mixed with mineral filler and the voids are determined on the total mineral aggregate. This is illustrated in Fig. 4, where the mesh composition of the sands is the same as for Figs. 1 and 2 but the void contours are plotted from determinations made on combinations of these sands with 20% and 40% respectively of a given commercial limestone filler. In the diagram at the left will be observed a certain similarity to the contours shown in Fig. 2. In the diagram at the right, however, it is apparent that the relationships have become radically altered and a number of independent low void areas have been created. Had some other commercial filler been used it is only reasonable to suppose that still different relationships would have been developed.

Fig. 6 is a curve drawn from the stability and voids in the aggregate of gradings produced by increasing percentages passing standard screens.

Voidage and Shear Strength in Asphalt Mixes

A PAPER by Hugh Skidmore and Gene Abson, both of the Chicago Paving Laboratory, read at the Atlanta Asphalt Conference, is in part as follows:

During more or less continuous investigation of asphalt paving mixtures in the past eight years, we have developed a rational method of designing such compositions. All of the information obtained during these years of study seems constantly and convincingly to lead to one outstanding conclusion, viz., that the voids in the dry aggregate normal to sheet asphalt and asphaltic concrete (and all modifications thereof) if correctly determined establish the quantity of bitumen necessary to satisfy not only practical considerations, but also extended laboratory investigation.

Beginning with a sand passing 80 and retained on 200-mesh, particles passing 40 and retained on 80-mesh were added in 10% increments. The curve incorporating these data shows a gradual decrease in voids to about 50% 40-mesh and 50% 80-mesh, then a gradual increase as the 80-mesh approaches zero per cent. This offers a variety of ratios of 40- to 80-mesh for further study by the adition of sand passing 10-mesh and retained on 40-mesh.

Three such combinations were chosen:

Passing 200-mesh	2.0%	1.9%	1.0%
Passing 80-mesh 69.4		39.8	27.2
Passing 40 mesh 28.6		58.3	71.8

This gives us three distinct combinations quite common to natural sand grading, viz., high 80-mesh, low 40-mesh, 40-mesh somewhat above the 80 and high 40, low 80-mesh.

By adding 10-mesh particles to a high 80, low 40 sand we note the lowest voids occur between 40% and 70% of the coarsest material. This gives us quite a wide range of low voidage sand with respect to the exact amount of 10-mesh, but it does show very conclusively, what we have always known from experience, that a fair amount of coarse sand between 10- and 40-mesh is excellent to low initial voids.

By adding 10-mesh to the second combination we note the effect of coarse particles upon a moderate 80-40 combination, and again we see that the lowest voids are accomplished with a high per cent of 10-mesh.

And by adding 10-mesh particles to the third combination we see the effect of 10-mesh sand upon a low 80, high 40 ratio, which is not at all uncommon in natural sand.

We now approach a more complex problem, that of studying the effect of filler upon sands of various normal grading. It would be impossible to show this study complete, so we select gradings that characterize some of our more common field conditions. Three such original sands are selected for study in combination with limestone dust filler; one high 80 and 10 with low 40, and one with low 80, medium 40 and high 10, which is common to coarser sand sometimes found necessary to use. A fourth combination of high 80 and 40, with very low 10-mesh, could have been added, but it is productive of such high voids as to be considered wholly undesirable. These three sands show original gradings as follows:

	A	B	C
Passing 80-mesh 25%		40%	15%
Passing 40-mesh 45		20	25
Passing 10-mesh 30		40	60

We may note the relative responsiveness of these three sands to reduction of voids by the addition of filler, and we note that the coarsest sand is productive of lowest voids as is characteristic of such sands, although not enough lower to be of any great consequence so far as final mixture is concerned unless it is also as workable and compressible and develops unusual stability. We are then confronted with two very important considerations, the relative stability and compressibility of these three sands when in final composition.

In studying the behavior of mixtures employing these three sands, we first design them according to the voidage principle, and, since the amount of final voids is controlled by the filler-content, we plot stability (shear strength at 140 deg. F) against per cent of filler in the mixture, each separate mixture containing the amount of bitumen required to fill voids in the dry aggregate.

While the coarsest sand gives the highest strength, you will note that the difference between the three sands is not phenomenal since they are about 10 ft. per sq. in. apart as a maximum for any given filler-content. Now we come to the next very important question, viz., how about compressibility?

Here we find a pronounced difference, and our "A" sand gives by far the best results.

The results just discussed appear to us as offering very substantial evidence of the correctness and practicability of the voidage basis of design of mixtures as well as the great usefulness of shear strength (simple shear) as a means of laboratory investigation of mixtures and materials and practical control. It seems perfectly obvious that this rational method of design is based upon data that clearly points out weaknesses in mineral structures of inferior grading, and shows conclusively that when paving mixtures employ what may be termed ideally graded materials these mixtures are not only most stable but also most workable and most susceptible to compression when the amount of bitumen present fills or nearly fills the voids.

Kansas City District Finds Consolidation the Solution for Too Many Quarries

Consumers Material Corp. Formed to Take Over Plants and Operations of Nine Leading Companies

"THE situation in the Kansas City district was such that a combination of quarry operations was inevitable," said R. Newton McDowell, president of the Consumers Material Corp., Kansas City, Mo., when he was asked why this consolidation of companies was organized.

"Quarry operations here are necessarily on a small scale as compared with those that supply the big markets of eastern states," he continued. "We have none of the big ledges that can be worked with faces 50 or 100 ft. high, or even higher. Our ledges are thin and the areas which are exposed so that quarries may be opened in them are limited. As the newly opened quarry advances into the hill the depth of overburden becomes so great that open pit quarrying finally becomes unprofitable. Some of the ledges worked here for crushed stone have inclusions of thin shale ledges that cannot be separated except by hand loading of quarry cars. All these things made for many small quarries in the district in the place of a few large quarries which, in other parts of the country, supply an equivalent market.

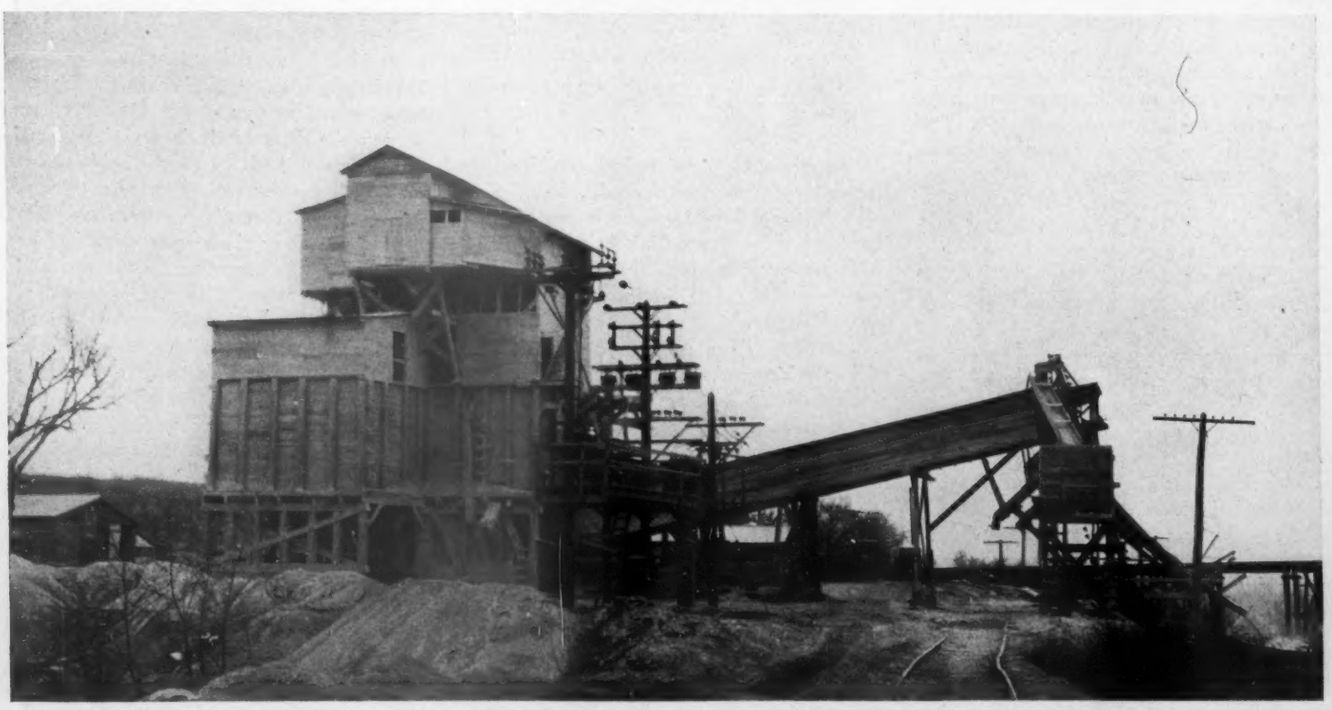
Idea Grew from Temporary Combination

"There was more or less combining of resources anyway. Whenever a really large job came up, two or three or perhaps four or five companies would pool their outputs in order to produce the tonnage needed in the required time. But such temporary arrangements are always unsatisfactory. Human nature being what it is, someone is bound to feel that he did not get his share of the tonnage or that the price might have been better or that he got the worst of it in some other way. So the only way that I saw to put the stone business on a really economic basis was to organize a company that would take over the plants and quarries of the principal producers and those who headed the other large producing companies received the idea very readily."

It might be added here that an important factor in the consolidation was Mr. McDowell's contacts with financial houses. The advantages of consolidation were obvious enough for a considerable time before the combination was effected, but he was better equipped to bring it about.

"Four companies came in at first," he explained, "and these operated eight quarries in the district. Later it was deemed advisable to include five other companies which also operated eight quarries. This gave the new corporation reserves of 17,000,000 tons of stone, estimating the deposits in a very conservative way. The combined capacity of the plants was in excess of that demanded by the market, but a part of the policy of the new company was to run only those plants which were needed. All the plants but one of those acquired have been put in such shape that they are ready to run on 24 hours' notice. The plants selected to supply stone for any particular job are those which are best situated for shipping to it by rail or truck. In this way what plants are run at all are run to capacity, producing stone at the lowest cost which the situation and the equipment makes possible.

"It was intended the public should benefit by this consolidation and it has benefited. The market price of stone today in the Kansas City district is $1.35 instead of $1.50 to $1.60, as it formerly was. Contrary to the general opinion, *we do not want a long price for stone* (and I wish you would make that emphatic). Our position depends on producing stone at a low cost and selling it with no more than a fair margin of profit. A long price for stone would mean the starting up of little hillside quarries all over the district and a disorganized business that would



Crushing plant of the Leeds quarry at Kansas City

Open quarry workings at the 54th street, Kansas City, plant

eventually leave no profit for anyone."

The history of the crushed-stone business in the Kansas City district bears out the truth of this statement, to the writer's knowledge. There is no competition from gravel in the district, and stone has been scarce rather than abundant. Yet, in the face of such favorable conditions, no one ever really made any money producing crushed stone, and the mortality in quarry companies has been high. The public has had to pay more for stone, and often found it hard to get, while at the same time the producers struggled to make ends meet. A fine example of the result of unrestrained competition among a large number of small producers.

Underground Mining Methods Used

"Mining stone (using underground methods instead of stripping a heavy overburden and quarrying in an open pit) had been introduced by two of our companies before the consolidation and we were able to continue this and introduce important economies in mining. We employ a mining engineer-geologist and our general superintendent was mining stone successfully when we took over his company. By studying the rock and by varying the system of drilling and shooting they were able to reduce the cost of explosives very materially. Then we introduced the Myers-Whaley underground shovel, the only machine of the kind we could learn of that would load stone satisfactorily where the roof was as low as we had to carry it. We have four of these shovels now. They lower the cost in two ways, by loading stone cheaper than it can be loaded by hand and by loading larger pieces, which keeps down the expense of secondary shooting. But such economies as these would hardly be possible to a single operation mining only a small tonnage daily.

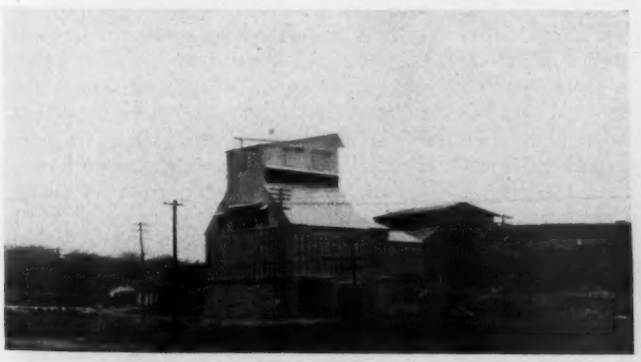
"We were perhaps unfortunate in starting in business at a time when construction in the Kansas City district was less than it has been in years. Building permits normally run around $23,000,000 yearly, but in 1927 they were only $15,000,000. However, there is every prospect of an improvement in the present season, for almost that amount is scheduled to be spent on two or three large jobs. Our present production is about 1,000,000 tons per year, and this should be materially increased in the coming year.

Combination Must Meet Two Problems

"We have two main problems. The first, and the most important as I consider it, is to educate the public to use only good clean stone for aggregate. The use of poor material in the Kansas City district is not limited to the small jobs. Last year there was only one large job in which the owner of the building paid any attention to the coarse aggregate and that building was not built by Kansas Citians. It was built by the Bell Telephone Co., under the supervision of their architect in St. Louis. The president of the Board of Public Works, Mr. Murray, who was formerly assistant chief engineer of the Missouri State Highway Department, has greatly improved the quality of the aggregate going into street paving and is now attempting to improve the quality of stone used in large structures such as apartment houses and office buildings, but it is an uphill job.

"Our second problem is to settle the situation that has arisen from cement companies engaging in the stone business. We have, of course, no objection to any cement company going into the stone business on a legitimate basis, but when it sells stone below a price that we know to be too close to the production cost to allow any profit, we consider it unfair to both the crushed-stone industry and the cement industry. Cement companies which are not in the stone business feel about it as we do. Such a practice is on a par with the secret rebating and other veiled forms of price cutting that formerly raised havoc with railroads and other businesses and caused the government to take a hand in their conduct.

"We have entirely eliminated selling by the yard in our own business and hope to make selling by weight the universal practice. We know definitely and positively that selling by the yard has been the base of dishonest competition. There are producers who have secured contracts at a per yard price that they could not fill if they furnished full measure. But they are able to fill them by furnishing four-fifths or even a less proportion of a yard for the yard price, and it often happens that the contractor never has suspicions that he is being cheated.



Crushing plant of the 54th street quarry at Kansas City, Mo.

Stripping the second layer of overburden at the 54th St. quarry

We believe the only honest way to sell stone is to weigh it on a standard scale and give a ticket for the weight with every load."

* * *

The details of financing a consolidation like the Consumers Material Corp. were explained by Mr. McDowell freely and at some length. The essential points are about as follows:

The four companies in the original consolidation, and the plants operated by them, were:

Consolidated Crushed Stone Corp. Two plants.
Kansas City Quarries Co. Three plants.
W. M. Spencer Co. Two plants.
Clay County Crushed Rock Co. One plant.

To these were afterwards added:

American Rock Crusher Co., Inc. Three plants.
Atlas Crushed Rock Co. One plant.
W. A. Ross Construction Co. (quarry only). One plant.
Thompson Bros. Rock Co. Two plants.
Twyman Crushed Rock Co. One plant.

Appraisal of All Properties Made

The first step was to have the properties appraised by the American Appraisals Co. In this appraisal no value was placed on the deposit, as some deposits were held under long lease and others owned outright. The owned land and such land as has since been purchased is carried on the books at its farm land or ordinary real estate valuation. As the original appraisal was not altogether satisfactory to some of the owners, a contract was finally entered into by which an arbitration board should settle upon a proper basis of exchange of stock and cash for the properties. In the main, no cash was given except to clear the properties of incumbrances on the title and such other obligations as the new company did not care to assume.

The cash to do this, to make certain necessary improvements in plants and equipment and to provide a sufficient working capital to engage in business on a large scale, came from the sale of an issue of 6½% sinking fund gold bonds which are a closed mortgage on the properties. The amount of the issue, $550,000, was $1,000 for each $2,300 of the appraised valuation of $1,265,556, which it will be remembered is the value of plants and equipment only, with no value for the deposits except ordinary real estate or farm land value. This may be considered conservative financing, for a conservative investment, according to stone producers of experience, is $1 invested for each ton of yearly production. The appraised valuation is at about that rate for a normal year's production.

The bonds were underwritten by the William R. Compton Co., of St. Louis, Mo., and sold to the public. An expense in connection with such a bond issue, often overlooked by organizers of companies, is that of having such bonds comply with the requirements of the various states in which they are offered for sale. Considerable legal work is involved and the expense totals to a considerable amount, as it did in this case.

Underground mining in the Leeds quarry. Workings are in the hard Bethany Falls ledge, which is overlain by a shale ledge under soft limestone

Earnings of the Companies

The combined earnings of the companies which were consolidated averaged $205,460 for the three years previous to the consolidation, which is in excess of 5.7 times the maximum annual interest requirement on these bonds.

The bonds are to mature in ten years, and a sinking fund requirement of $32,500 for the first year and $57,500 annually thereafter was made. It would be better in the opinion of those who have studied the matter for the term of maturity to be longer, say 15 years, and for the sinking fund requirement to begin with the second or third year. There are many expenses of operation which grow out of the fact that the new company is a consolidation and not a single company. For example, the change to running fewer plants to capacity, instead of all the plants to part capacity, demanded that the plants chosen be put in the best condition for economical working. And even the closing down of the plants that were to remain idle was a source of considerable expense, since they had to be put in such a condition that they would not deteriorate and yet could be put in operation at short notice. The matter of retail selling and of truck deliveries demanded the building up of a new organization, the overhauling and consolidating of trucking equipment and the working out of a system to deliver from a few points instead of many, which was a matter of still more expense. And it must be remembered that all this was done with a decreased instead of an increased price for the stone that was sold.

A part of the financing peculiar to this particular consolidation had to do with the money furnished by the state of Missouri to one of the companies, the Consolidated Crushed Stone Corp. A cash payment of $180,000 on this debt had to be made, but with this came a contract for all the state's requirements which could be reasonably furnished from the company's quarries until the remaining $130,000,000 of the debt should have been paid to the state at 10 cents per ton. This contract has been carried as a "contractual liability," but it is in a way an asset, since it provides a certain market for so large a part of the output and allows a large portion of the amount due the state to be paid on very favorable terms.

A favorable contract was also made with the largest user of crushed stone in the district, the Kansas City Ready Mixed Concrete Co.

The balance sheet set up by the company December 31, 1926, at the time the bonds were placed on the market, shows that the company had current assets of $212,440, of which $183,748 was cash and the remainder inventories, that it had fixed assets of land, machinery, trucks, tools, plant and equipment amounting to $1,265,556, as appraised by the American Appraisals Co.; and advanced stripping, bond discounts and other deferred charges of $123,250. The liabilities offsetting these assets were: Notes payable, $12,000; bond issue, $550,000; contractual liability (Missouri State Highway Commission), $130,000; prior preferred stock, 8%

cumulative, callable at $110, issued portion of amount authorized, $222,600; preferred 7% cumulative stock, $100 par value, issued portion of authorized amount, $657,500, and 9,558 issued and outstanding shares of no par common stock (of an authorized 17,000 shares), which were given a value to balance of $29,146.

The issues of prior preferred and preferred stock were made because some of the owners of property that was taken over by the company wished their return in stock to be in that form.

Consolidation a Success

At the time the notes for this article were made the Consumers Material Corp. had been in operation for a year and it was possible to judge whether or not the consolidation would work out to the interest of the interested parties, the public and the owners of the consolidated quarries. As regards the public there can be no question but what it has benefited. It is getting better stone and getting it cheaper. It is also in a position to be served when the demand for stone rises to abnormal peaks and large quantities are wanted in a hurry.

Remarkable find of skeleton of Plesiosaurus in the Red Triangle Quarries, Harbury, Warwickshire

As regards the former owners of the quarries, the benefit to them would be more apparent if 1927 had not been such an abnormal year. With construction only two-thirds of its normal amount, the sales could not be what they would have been in such a year as 1925, for example. And then one must consider the heavy expense involved in changing the form of operation. With all these handicaps the new company met its interest charge and sinking fund requirement and maintained its credit. With such a small volume of business it is doubtful if the individual producers would have done as well, especially at the lower price of stone. In the opinion of those who are in a position to know, the record of previous years makes it rather certain that they would not have done so well. It seems clear that the former owners of the consolidating companies have a more stable property in their interest in the consolidation than they would have had in their individual properties. This will be more apparent after another year has given the consolidation the opportunity to benefit by the economies it has introduced and to be relieved of the first year's expense.

The offices of the corporation are in the Midland building in Kansas City.

Fossil Remains of Three-Eyed Reptile Discovered

THE fossil remains of a plesiosaurus, an extinct member of the lizard family which is estimated to have lived between 100,000,000 and 200,000,000 years ago, was recently unearthed in the Red Triangle Quarries at Harbury, Warwickshire, England.

The find is considered a rare one in that the head was attached, whereas generally the head is missing in such discoveries. The head is triangular and has a third eye on top of the skull. The vestige of the third eye remains in man in the form of the pineal gland. A similar structure, more nearly eye-like in character, is found in the nearly extinct lizard *Sphenodon*, of New Zealand.

The skeleton is 16 ft. long, which is an unusual size, for the majority found have been approximately 6 ft. long. The specimen was dug out of a bed of lower lias clay. It may have died when England was at the bottom of the sea or possibly it crawled up on the seashore to die.

Directory of Ohio Mineral Industries

A RECENT bulletin has been received from the Geological Survey of Ohio which is in the form of a directory of firms producing the various minerals throughout the state. It is Bulletin 33 of the Fourth Series and is enitled "Mineral Industries of Ohio." The book lists the producing firms with the location of their plants and some essential facts about their products. In the rock products field there is a complete list of limestone and lime producers, as well as portland cement, sand and gravel, and silica sand producers. A map accompanies the bulletin showing the location of the industries. This book is the work of J. A. Bownocker and W. Stout, of the state geological survey.

Withdrawals of Phosphatic Land in Idaho

THE original phosphate withdrawals have been greatly modified as a result of recent geological work in Idaho and of similar work by the Geological Survey in adjacent states. In December, 1908, when the western phosphate reserve was created, the Secretary of the Interior withdrew from all kinds of entry 4,541,300 acres in Idaho, Utah and Wyoming. On July 31, 1927, the total outstanding withdrawals, which now include some land in Montana, amounted to but 1,966,390 acres, distributed as shown in the following table:

OUTSTANDING PHOSPHATE WITHDRAWALS, JULY 31, 1927

	Acres
Utah	301,945
Idaho	391,532
Wyoming	992,969
Montana	279,944
	1,966,390

In addition to lands embraced in the outstanding withdrawals, 268,299 acres in Idaho, 25,293 acres in Wyoming, 3,833 acres in Montana, and 160 acres in Utah—297,585 acres in all—have been examined in detail and formally classified as phosphate land. The total classified and withdrawn lands in the western phosphate field thus amount to 2,263,975 acres.

Estimates of reserves in the western phosphate field and in the country as a whole are given in the following table:

ESTIMATE OF PHOSPHATE ROCK IN THE UNITED STATES AVAILABLE DEC. 31, 1925

Eastern Field:	Long tons
Arkansas	20,000,000
Florida	291,000,000
Kentucky	878,000
South Carolina	8,788,000
Tennessee	83,500,000
Total eastern field	404,166,000
Western Field:	
Idaho	4,997,855,000
Montana	391,323,000
Utah	326,745,000
Wyoming	115,754,000
Total western field	5,831,677,000
Less approximate quantity mined since 1906	350,000
	5,831,327,000
Eastern reserve as above	404,166,000
Total for United States	6,235,493,000

—*G. D. Mansfield in Mining and Metallurgy.*

Concrete Report Translated

THE Report of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete, together with the specifications appearing with that report, is being translated into Spanish and published serially in *Ingenieria*, the journal of the National Faculty of Engineers, National School of Engineers, Tacuba, Mexico.—*A. S. T. M. Bulletin.*

Digest of Literature on Nature of Setting and Hardening Processes in Portland Cement

Part II.—The Theory of Crystallization from Supersaturated Solution

By R. H. Bogue

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PERHAPS the first careful study of the hardening of mortars is due to Lavoisier.[17] In 1765 he published the following brief note on the setting of gypsum:

If gypsum, which has been deprived of its water by heating, is again treated with water, it takes up the latter with avidity, a rapid and irregular crystallization occurs and the small crystals which are formed are so entangled with each other that a very hard mass results.

In this case, the partially dehydrated gypsum, $CaSO_4 \cdot \frac{1}{2}H_2O$, was believed merely to return to its original composition, $CaSO_4 \cdot 2H_2O$. This idea was extended by Vicat, as already shown, to the setting generally of all types of cements which produced, on treating with water, a hard and strong material. According to Vicat, setting and hardening took place as a direct consequence of a chemical reaction between the lime or other material and the water to form a hydrate.

Studies of LeChatelier

The reason why this should be so, however, and the nature of the hardening process following such reactions of hydration were not considered seriously until LeChatelier[18] studied the problem, which was reported in complete form in 1887.

The mere felting together of rigid crystals was shown by LeChatelier to be inadequate to explain the hardening observed in cements. To demonstrate this he recalled that the precipitation of calcium sulfate from an aqueous solution of this salt by alcohol gave a deposit of fine crystals showing excellent felting of the crystals, but that the mass showed no cohesion or resistance to rupture.

In order to treat the whole subject in a systematic manner, the processes of hardening were divided into three rather distinct phases:

The chemical phenomenon of hydration,
The physical phenomenon of crystallization, and
The mechanical phenomenon of hardening.

These were treated separately, and for convenience in presentation will be considered separately in this review.

HYDRATION—It was accepted as a premise that the underlying requirement for the development of a set and hardness in the materials under consideration is the interreaction of these materials with water to form hydrated compounds. The classic example of this type of reaction may be used to indicate the chemical nature of hydration. Gypsum on moderate heating is decomposed as follows:

$$CaSO_4 \cdot 2H_2O = CaSO_4 \cdot \tfrac{1}{2}H_2O + 1\tfrac{1}{2}H_2O$$

On treating the product with water the gypsum is again formed:

$$CaSO_4 \cdot \tfrac{1}{2}H_2O + 1\tfrac{1}{2}H_2O = CaSO_4 \cdot 2H_2O$$

The exact nature of the hydration of cement compounds was not so well understood, but it was assumed that somewhat similar reactions took place.

CRYSTALLIZATION—In a solution which is just saturated, crystallization cannot take place. But if some change in condition is brought about whereby a temporary metastability or supersaturation is obtained, then equilibrium normally is re-established by crystallization. The slow evaporation of the solvent, a change in temperature (in the direction of decreasing solubility), or the introduction of some other phase which competes for the solvent may each produce a condition of supersaturation with respect to the initial solute, and result in crystallization. In order to explain the formation of a crystalline precipitate from an aqueous solution, one of these phenomena or some other agency of similar effect must manifest itself.

Landrin[16] had suggested that the set of plaster is due to supersaturation with calcium sulfate brought about by evaporation, but LeChatelier showed that evaporation could have practically no influence in the process since the set took place equally well when the mixture of plaster and water was placed in sealed containers.

Marignac[19] observed, however, that there was a marked difference between the solubility of the hemihydrate, $CaSO_4 \cdot \frac{1}{2}H_2O$, and that of the dihydrate, $CaSO_4 \cdot 2H_2O$. He found that:

If a solution of calcium sulfate is prepared by agitating calcined plaster with a certain quantity of water and filtering the liquid at the end of about five minutes, a solution about five times as concentrated is obtained as if it had been prepared from calcium sulfate hydrated with two molecules of water. But this solution quickly becomes cloudy, deposits crystals of gypsum, and at the end of a longer or shorter time returns to its normal concentration. The saturated solution of dehydrated calcium sulfate is therefore supersaturated by comparison with the hydrated sulfate.

A theoretical solubility ratio of $CaSO_4 \cdot \frac{1}{2}H_2O$ to $CaSO_4 \cdot 2H_2O$ of 7 was found by LeChatelier by an application of the thermodynamics of solutions, but the ratio of 5 found experimentally by Marignac is in satisfactory agreement considering the instability of the hemihydrate.

Similar differences in the solubility of other hydrated and anhydrous salts have been noted. Thus Coppet[20] has shown that anhydrous sodium sulfate gives solutions which are strongly supersaturated with respect to the hydrate, even when care is taken to prevent any rise in temperature.

As a result of these studies, LeChatelier concluded that the crystallization of plaster and other cements takes place from supersaturated solutions, and that this metastable state is the result of marked differences between the solubility of the anhydrous (or only partially hydrated) salts and the hydrated salts. He believed that this reaction may approach completion because, as the hydrate separates out, the solution is left unsaturated with respect to the anhydrous material. Hence more of this will continue to dissolve, and eventually all of it will have passed through the solution phase into the crystalline hydrate. This general theory was shown by LeChatelier to apply not only when the reaction is between some salt and water but also when the reaction is between one salt held in solution and another in the solid state, provided the solubility of the solid in the aqueous solution is greater than that of a product which would result from the interaction of the two. Examples of such are as follows:

Zinc chloride solution added to zinc oxide and shaken for five minutes gives, after filtering, crystallized oxychloride of zinc.

Calcium chloride solution agitated with calcium hydroxide and filtered gives a voluminous mass of crystals of calcium oxychloride.

Potassium sulfate solution shaken with powdered gypsum and filtered gives such copious precipitation of double sulfate that the liquid becomes pasty.

Alkali carbonate solution shaken with calcium hydroxide and filtered results in crystallization of calcium carbonate.

It was shown also for barium silicate and for several calcium aluminates that solutions may be obtained in a brief period which are supersaturated with respect to the hydrated compounds which later crystallize out and

contribute to the set.

The rate of set under this hypothesis should be determined by the degree of supersaturation attained and the latter in a large measure is dependent on the difference in solubility of the two phases. Hence the more soluble salts will go into solution more rapidly and the set will be accelerated. Thus according to LeChatelier calcium sulfate hemihydrate is more soluble than the calcium aluminates and these more soluble than the calcium silicates. Consequently the set will be most rapid with the calcium sulfate and slowest with the calcium silicates. It follows also that the introduction into the solution of some material which changes the solubility will change in the same direction the degree of supersaturation attained, and hence the rate of set. All of these considerations have been verified by LeChatelier.

The form of crystals is known to be subject to modification which depends on the conditions surrounding precipitation. LeChatelier found that crystals precipitating from highly supersaturated solutions frequently were abnormally developed along the principal axis, resulting in "long, extremely slender prisms, true threads whose length may exceed 100 times their thickness." These usually grew in spherulitic form about a nucleus. This condition was found to be true of many salts (e.g, sodium acetate, sulfate and hyposulfite) which normally crystallize equally developed in all directions.

HARDENING—The final hardness or strength of the set mass, according to LeChatelier, will depend upon the cohesion of the crystals and upon their mutual adhesion. He defined cohesion as "an ultimate quality of matter, which we are not able in the present state of our knowledge to connect with any more simple and more general fact." He regarded adhesion as "a very complex and consequently very variable phenomenon." The latter property is found to vary with a number of conditions, as the surface exposed, the distribution of voids, the nature of the solvent, the temperature, et cetera. A high development of both cohesion and adhesion seemed necessary to LeChatelier for the production of a strong cement.

Application to Portland Cement

On directly applying the above theory of hardening to portland cement, LeChatelier concluded that the fundamental reaction which brings about the hardening in these cements is a splitting up of the basic tricalcium silicate giving monocalcium silicate hydrate and calcium hydroxide:

$$3CaO{\cdot}SiO_2 + aq = CaO{\cdot}SiO_2{\cdot}2\tfrac{1}{2}H_2O + 2Ca(OH)_2.$$

The tricalcium aluminate he at first believed to form a tetracalcium aluminate hydrate:

$$3CaO{\cdot}Al_2O_3 + Ca(OH)_2 + aq = 4CaO{\cdot}Al_2O_3{\cdot}12H_2O,$$

but later as a result of the investigations of Candlot, he conceded that the product in this instance was tricalcium aluminate hydrate. The latter reaction appeared to be rapid and so was held to be responsible for the development of the "set." The real hardening, however, was held to be occasioned "almost exclusively by the slow and progressive hydration of the calcium silicate, which, after having begun during the setting, continues entirely alone."

The strength and hardness developed by the crystallization of these hydrates from their supersaturated solutions (due to greater solubility of the anhydrous than of the hydrated compounds), according to the theory of LeChatelier, is dependent upon the cohesion within the crystals themselves and the adhesion between the individual crystals and between these and the other bodies present.

Since cohesion is regarded by LeChatelier as a specific property of each crystalline material, he considered that nothing further need be said about this except that the maximum ultimate strength of any crystalline mass is limited by the cohesion of that particular crystal material.

In mortars and concretes, the adhesion becomes a property of importance and, according to LeChatelier, depends on many factors. The *chemical nature* of the bodies in contact is important, for certain crystals will adhere to one material and not to another. Thus the addition of sand to plaster is not permissible, as the adhesion between these is very low, while lime silicates may advantageously be mixed with sand since in this case the adhesion is high.

The extent of the *surfaces of contact* determines the degree to which adhesion exerts its influence. This will vary with the form and size of crystals, and with the volume and manner of distribution of the voids. LeChatelier held that "a very weak adhesion, per unit of surface, if it is multiplied by a considerable extent of surface, will give as the result a very great total force of adhesion, which may even equal the internal cohesion of the crystals." Since the surface of crystals increases in proportion as they are more elongated (as formed by crystallization from supersaturated solutions) and as they are sharper (as contrasted with rounded sand grains) it follows that cement mortars with ground sand are eminently suited to produce high adhesive strength.

Voids are caused by the presence of an excess of water in the original mixture above that which is necessary for hydration. Since any increase in the volume of voids results in a corresponding decrease in the surface of contact of the crystals, the presence of these voids, and hence the amount of excess mixing water, should be reduced to the minimum. Here again, elongated crystals maintain contact and hence develop strength even with a much higher percentage of voids than would cubic crystals; or, conversely, with a given percentage of water or voids, a higher percentage surface of contact will be maintained and hence higher strengths will be developed, when the crystals are elongated than when they are cubic. Furthermore, any method of removing the excess water after placing would diminish the voids proportionately and consequently increase the surface of contact and the strength.

Summary

To sum up the generalizations of LeChatelier, he believed that setting and hardening of cements were due to:

1. The solution in water of an anhydrous or but partially hydrated salt.
2. Reaction of the dissolved salt with water, to form a higher hydrate.
3. The precipitation of this hydrate due to its lower solubility and consequent development of a supersaturated solution.
4. The formation of very small but elongated crystals during precipitation which favors interlacement and large contact surface.
5. The specific properties of high cohesive and adhesive qualities on the part of the precipitated crystals.

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(To be continued.)

Talc Production in 1927

THE total quantity of talc sold by producers in the United States in 1927 was 192,316 short tons, valued at $2,234,724, according to figures compiled by the United States Bureau of Mines, Department of Commerce, from individual reports furnished by producers. The figures comprise 5706 tons of crude talc. valued at $25,365; 1494 tons of sawed and manufactured talc, valued at $111,650, and 185,116 tons of ground talc, valued at $2,097,709. Both total quantity and value increased 6% as compared with 1926. There was 20 producers of talc in 1927 as compared with 22 in 1926.

Of the total quantity sold, New York supplied 94,553 tons, valued at $1,191,453, as compared with 83,231 tons, valued at $1,030,075, in 1926; Vermont supplied 54,688 tons, valued at $503,716, as compared with 53,510 tons, valued at $514,527, in 1926; and California supplies 15,760 tons, valued at $238,755, as compared with 15,419 tons, valued at $233,292, in 1926. The remainder of the output was produced by Georgia, Maryland, New Jersey, North Carolina, Pennsylvania and Virginia. Imports of talc for consumption in 1927 were 25,194 short tons, valued at $550,382.

Producing High Alumina Slags for Alumina Cement[1]

By T. L. Joseph
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THE purpose of this article is to describe briefly the operation of a 6-ton blast furnace on a charge of bauxite, limestone, iron ore and cast-iron turnings and to point out the bearing which smelting such a charge has upon the production of alumina cement. One object of the experiment, conducted by the Bureau of Mines in co-operation with the Aluminum Co. of America, was to determine whether the so-called Pedersen process[2] can be applied to the blast furnace. This process consists of smelting a charge of bauxite, iron ore and limestone and results in two products. One is a slag containing about 50% of Al_2O_3 and is intended for use in manufacturing aluminum, and the other is iron low in sulphur. Completed details of the test are published in other reports.[3]

Blast-furnace slag is now recognized as a satisfactory and economical raw material for making portland cement. Wm. A. Forbes[4] has recently reported that in 1926 an important steel interest used well over 1,000,000 tons of slag in producing about 2,250,000 long tons of cement. This is equivalent to about ½ ton of slag for each ton of cement. Alumina cement can be made direct in the blast furnace. Its physical character would have to be changed by grinding, but no change in its chemical composition would be necessary.

Alumina Cements

This type of cement was of special value to the French army during the world war for construction of gun emplacements and roads. It is characterized by its high alumina content, high strength at early periods, and resistance to chemical attack, particularly sea-water. Since the war, interest has steadily increased in its application to general construction work in which time has economic importance. Raw materials and technical details connected with the manufacture of alumina cement and portland cement differ markedly. Most of the alumina cement is made by secret or patented processes involving partial or complete fusion of the raw materials.

The high-alumina cements are made by the fusion of bauxite and limestone in an electric furnace or by clinkering in a rotary furnace. The use of aluminous cements ensures outlet for a considerable tonnage of the lower grades of bauxites which cannot now be used for other purposes. A typical analysis of aluminous cement is 10 to 12% silica, 40 to 45% alumina, 35 to 40% calcium oxide, and 15 to 20% iron oxide. The interest in aluminous cement brings up an important question with regard to the future supplies of bauxite for this new industry. French production is now about 500,000 bbl. per annum, equivalent to about 83,000 long tons, or about one-eighth of the total output of portland cement. The world production of portland cement is running at the rate of 420,000,000 bbl. per annum, equivalent to 70,000,000 long tons. If 10% of this were converted to aluminous cement, and there is ample scope for this production, the amount of bauxite required in making it would be about 3,500,000 tons. Thus, there may easily be caused an acute shortage of bauxite. French producers indeed have been pinched for supplies recently. Much has been written on the relative merits of high-alumina and portland cements, but such matters are beyond the scope of this report.

According to French specifications,[5] alumina cements must contain not less than 30% of Al_2O_3 and not more than 1% of S. The sum of the CaO and MgO must not be greater than the sum of the SiO_2 plus Al_2O_3.

SYNOPSIS—There seems to be little doubt as to the feasibility of operating a blast furnace on a charge of bauxite, limestone, and iron ore, so as to produce a substantial amount of iron and a slag which falls within the range of composition of alumina cements. The Bureau of Mines in co-operation with the Aluminum Co. of America, produced about 70 tons of high-alumina slag in a test run with a six-ton experimental blast furnace. Forty to fifty per cent of the product was low-sulfur metal. —Editor.

Tests with a Six-Ton Blast Furnace

During a 3-weeks test about 70 tons of high-alumina slag were produced in an experimental blast furnace. The slag composition varied over a wide range during the test. The range of composition covered follows: SiO_2, 6 to 33%; Al_2O_3, 18 to 53%; CaO, 35 to 52%; TiO_2, 1 to 2%; FeO, 1 to 2%; and S, about 0.5%. Most of the 70 tons of slag made during the test was in the high-alumina range, the large change in composition being made during the transition from slag of about normal composition to high-alumina slag. The average composition (in per cent) for the whole test is as follows:

SiO_2	Al_2O_3	FeO	CaO	MgO	TiO_2	S
7.88	43.44	1.17	44.11	Trace	2.07	0.72

During the latter part of the test the Al_2O_3 in the charge was increased. An average analysis (in per cent) of the slag made during this period follows:

SiO_2	Al_2O_3	FeO	CaO	MgO	TiO_2	S
8.46	47.24	1.44	39.64	Trace	2.12	0.70

The production of this slag offered no difficulty. Blast pressure, an indicator of general furnace operation, was uniformly low. Only moderate blast temperatures were obtained, the average for the period being 885 deg. F. There seems little doubt as to the feasibility of operating a blast furnace on a charge of bauxite, limestone, and iron ore, so as to produce a substantial amount of iron and a slag which falls within the range of composition of alumina cements. The iron oxide in slag made in a blast furnace would differ from alumina cements made by simple fusion of raw materials, because most of the iron in the bauxite would be reduced to the metallic state in the blast furnace and recovered under proper conditions as low-sulphur metal.

The work of Rankin and Wright[6] on the ternary system lime-alumina-silica indicates that alumina cements have relatively low fusion temperatures. Figs. 1, A and B, taken from their report, show that the compounds containing approximately equal amounts of lime and alumina, and perhaps 5 to 10% of silica, have comparatively low melting points. The ternary eutectic for $B_2CaO{\cdot}SiO_2$, CaO·

[1]Abstract of serial No. 2869, Department of Commerce, Bureau of Mines.

[2]*Mining Journal* (London), Developing aluminum production in Norway: May 29, 1926, p. 440. Norwegian Patent 43,415; French Patent 596,400; British Patent 232,930; Canadian Patent 269,220; Swedish Patent 115,356.

[3]Joseph, T. L., Kinney, S. P., and Wood, C. E., Production of High-Alumina Slags in the Blast Furnace: Am. Inst. Min. and Met. Eng. Tech. Paper 112, February meeting, 1928; Tech. Paper 425, Bureau of Mines (in press).

[4]Forbes, Wm. A., Technological problems of the steel industry: Year Book, Am. Iron and Steel Inst., 1927, p. 266.

[5]*Chemical Abstracts*, Vol. 19, August 10, 1925, p. 2396.

[6]Rankin, G. A., and Wright, F. E., The ternary system $CaO{\cdot}Al_2O_3{\cdot}SiO_2$: *Am. Jour. Sci.*, ser. 4, vol. 39, 1915, pp. 40-41.

Al_2O_3, and $5CaO \cdot 3Al_2O_3$, which has a composition of 49.5% CaO, 43.7% Al_2O_3, and 6.8% SiO_2, melts at 1335 deg. C. ± 5 deg. Even small amounts of such a eutectic would have a very appreciable effect upon the temperature - viscosity relations of the slag, a matter of great importance in blast-furnace operation.

E. C. Eckel[7] has obtained several patents on a process for making iron and cement in the blast furnace, but the experimental-furnace test is, so far as the writer is aware, the first systematic experiment to determine whether the iron in the charge can be reduced to the same extent as in normal blast-furnace practice. Alumina cement has been made in water-jacketed furnaces, about the dimensions of a cupola, but the process is primarily a melting operation and not a reducing and melting operation, as is the case with the blast furnace. Slags containing about 35% of Al_2O_3 have been made in industrial blast furnaces, but the general composition of such slag does not closely approach that of high-alumina cements.

Raw Materials Used in Test

The analyses (in per cent) of some 60 tons of bauxite used in the test follow:

Car	Al_2O_3	SiO_2	Fe	CaO	MnO	TiO_2	Ig. loss
1	57.62	2.75	16.77	0.78	0.48	2.64	13.72
2	57.06	2.78	16.32	.....	.....	3.08	13.41

Limestone containing about 53% CaO, 1% SiO_2, and 0.5% Al_2O_3 was used to adjust the CaO content of the slag. By-product coke containing about 7.5% ash was used as fuel. High-grade iron ore (63.5% Fe) and cast-iron turnings were used to vary the amount of iron made. The exit gas from the furnace averaged 30.32% CO and 6.83% CO_2 by volume. Its heating value therefore would be about 15% greater than that of blast-furnace gas.

In addition to the value of the cement and iron produced, a substantial credit for the gas could be obtained in industrial centers.

Economic Considerations

In considering the cost of operating a blast furnace to produce alumina cement, the geographical location of the furnace is important. Due to the advantages of securing cheap imported bauxite, it has been assumed in the following cost estimates that the furnace site is along the North Atlantic coast. Prices have been assumed for all raw materials at such a location. These estimates indicate the relative amounts of raw materials, particularly fuel, which would be required. More reliable information as to the actual cost of materials can be inserted in an estimate once the proportions of raw materials and products are known with fair accuracy.

The proportions of raw materials and products which will be given are based upon data obtained in operating a 6-ton blast furnace and upon industrial furnace practice. There might be a choice between an all-scrap charge, all-iron and no-scrap, and a combination of iron ore and scrap. Therefore three cost estimates have been made.

ALL-SCRAP BURDEN

Material	Pounds per ton of iron	Tons per ton of iron	Cost per ton	Material cost per ton of iron
Bauxite	2,100	0.948	$6.00	$5.70
Stone	1,850	.826	1.50	1.25
Borings	2,100	.948	11.00	10.40
Coke	1,900	.95	6.00	5.70
Cost above:				
Labor				$1.00
Maintenance and repairs				.50
Steam				.35
Relinings and renewals				.30
Other costs				.75
				$25.95
Products:				
Alumina cement (not pulverized), 1 ton				$30
Pig iron, 1 ton				20
				$50

ALL-ORE BURDEN

Material	Pounds per ton of iron	Tons per ton of iron	Cost per ton	Material cost per ton of iron
Bauxite	3,260	1.455	$6.00	$8.70
Limestone	2,800	1.25	1.50	1.90
Ore	2,800	1.25	6.00	7.50
Coke	3,350	1.675	6.00	10.00
Cost above				$2.90
				$31.00
Products:				
Alumina cement (not pulverized), 1.6 tons at $30				$48
Pig iron, 1 ton				20
				$68

ORE-SCRAP BURDEN

Material	Pounds per ton of iron	Tons per ton of iron	Cost per ton	Material cost per ton of iron
Bauxite	2,175	0.97	$6.00	$5.80
Limestone	1,865	.83	1.50	1.25
Borings	1,245	.56	11.00	6.15
Ore	1,245	.56	6.00	3.35
Coke	2,240	1.12	6.00	6.70
Cost above				$2.90
				$26.15
Products:				
Alumina cement (not pulverized), 1.1 tons at $30				$33
Pig iron, 1 ton				20
				$53

A preliminary cost study indicates that 1 ton of metal and 1 to 1½ tons of slag can be produced in the blast furnace for about $25 to $30, allowing no credit for surplus gas. If 1 ton of alumina cement is worth $30 and 1 ton of pig iron $20, the combined value of these products would be $50, which leaves an attractive margin for grinding the slag, marketing costs, and profit.

Utilization of Southern Bauxites

Localities where limestone, bauxite, coke, and scrap can be assembled obviously have a preference, for economic reasons. For such a location attention turns at once to the Southern States. The successful beneficiation of high-silica bauxites, a problem under investigation by the Bureau of Mines at its Southern Experiment Station, would make large tonnages of low-grade bauxite available for the manufacture of aluminum as well as alumina cement.

[7] U. S. Patent 1,536,381, Process of making iron and cement; U. S. Patent 1,536,382, Process of making iron and cement; U. S. Patent 1,535,405, Process of making iron and cement.

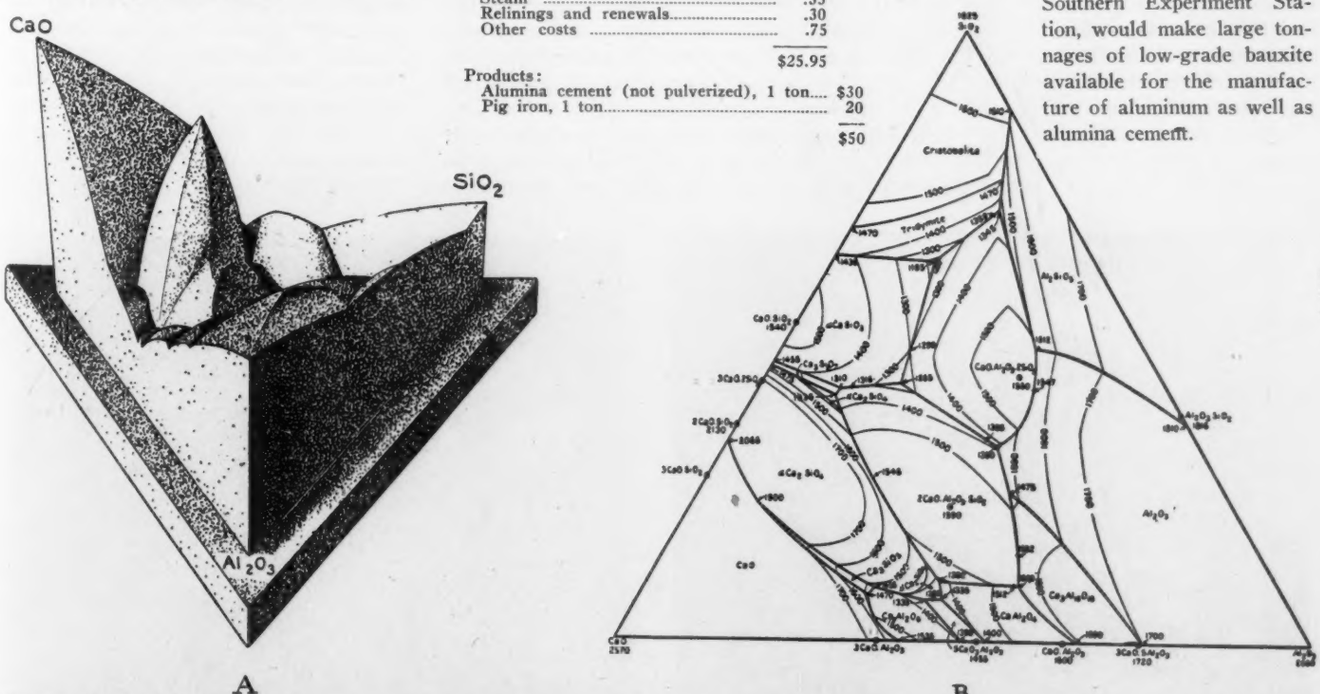


Figure 1. A, Solid model of the ternary system $CaO-Al_2O_3-SiO_2$; B, projection concentration-temperature diagram of ternary system $CaO-Al_2O_3-SiO_2$ with isotherms and melting temperatures of compounds and invariant points.

Fig. 25. The Hoennetal plant of the Rheinisch Westphalischen Kalkwerke, showing the storage house in the center and the kiln building at the right

Lime Burning Practice Based on European and American Observations

Part VI.—The Hoennetal Plant of the Rheinisch Westphalischen Kalkwerke

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

THE HOENNETAL PLANT of Rheinisch Westphalischen Kalkwerke has, almost without doubt, the largest capacity of any single lime plant. They employ 10 ring kilns of 60 tons capacity each, and four mixed-feed kilns of 80 to 90 tons each, in all a possible output of over 900 tons per day.

The ring kilns are used to quite an extent in Germany, but they will be gradually eliminated; to us, in the United States, they have no direct interest; still they will be described to an extent later on in this series. The information derived from their study is of interest mainly in the bearing they have upon the possible use of continuous feed kilns, the use of which one hears frequently advocated even in this country.

Fig. 25 is a view of the building containing the storage bins in front, and the building containing the kilns in the rear. Fig. 26 shows a rock cart bringing stone from the crushing and screening plant. The size of stone used in the mixed-feed kilns here varies between 1½ and 6 in. with a tendency towards the smaller sizes. Consequently the stone used is so small that one cannot well consider it for any gas or direct-fired kiln; and in addition it is quite un-uniform, making the situation much worse, because the small material fills the voids between the larger lumps of stone and chokes the draft.

The larger and more uniform sizes of rock as obtained from the quarry are used in the ring kilns, while the various grades below 1½ in. are classified as sand, garden gravel and fine and coarse concrete gravel.

The stone from the carts (Fig. 26) is dumped into storage bins, and from these drawn into monorail cable cars (Fig. 27) and pulled to the top of the kiln (Fig. 28). This system of conveyance appeared to be quite satisfactory.

Of the four kilns used, two have the charging system shown in Fig. 29. The rock and coke drop on a shelf, which is sup-

Fig. 26. A rock cart bringing stone from the crushing and screening plant

Fig. 27. The material is taken from storage bins to the kilns by monorail cars

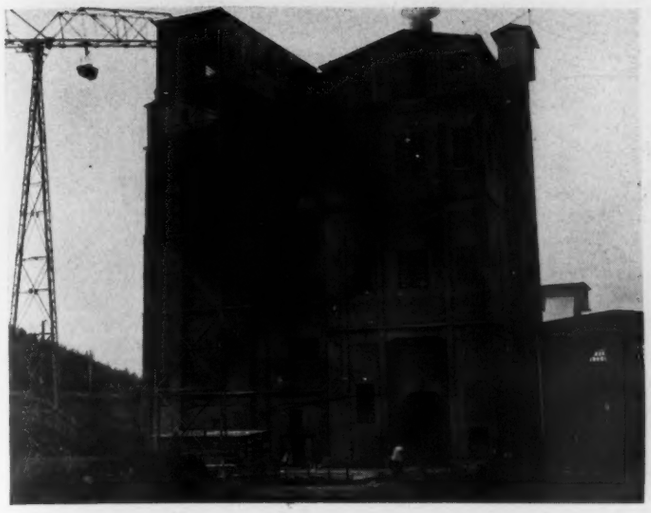


Fig. 28. The kiln building, showing car of material being taken to the top of the kilns

ported on rollers and travels continuously around and around the control part of the kiln. Adjustable knives are located so that the stone and fuel are distributed supposedly equally; however, this does not happen and these two kilns while more complicated are far less satisfactory than the remaining two.

Fig. 30 is a sketch showing the outline of the two more satisfactory kilns. The shell is made of reinforced concrete, the kiln has an active or effective height of 57½ ft. and a diameter in its lower portion of 15 ft. Fig. 31 shows the proportions of different components of the wall, reinforced concrete, sand, common brick and fire brick. Such a construction may be all right for a mixed-feed kiln, but to have only about 12 in. of fire brick backed by common brick in a gas-fired kiln is rather likely to give a great deal of trouble. Otherwise, however, such kiln would be of greater permanency than a

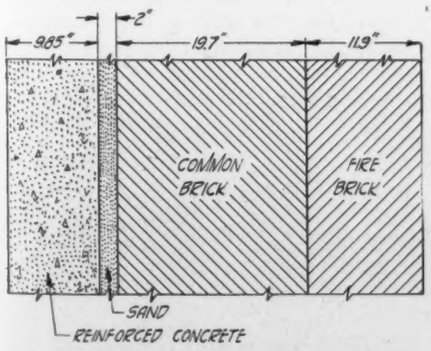


Fig. 31. Section showing the proportions of the components of the kiln wall

steel-shell, lined; it is also tighter, neater and cheaper in the long run.

The charging of the kiln (Fig. 32) is rather simple and most satisfactory. There are pockets, four to a kiln, with gates underneath. One of these pockets can be seen plainly, containing coke, also the monorail car with limestone. With mixed-feed kilns, it is rather important that the fuel and the limestone be distributed in layers of proper and uniform thickness. In most plants the distribution is accomplished by hand. Here, however, this is not necessary. If the coke in the pocket is allowed to drop into the kiln of its own accord, due to its lightness, it would naturally fall to a different point than the heavy limestone. To overcome this, after the pocket is charged with coke, stone is added, after which the gate shown in Fig. 30 is opened, and the mixture is allowed to drop into the kiln; with the weight of stone in back of it, the coke is properly distributed. After this is done at each of the four charging pockets several charges of stone alone are added.

This means of charging is very satisfactory, and also very simple; then also the kiln top remains shut practically all the time, and if the chimney has any extra draft, this draft works on the kiln proper by increasing the capacity.

The drawing of lime is even simpler (Fig. 30); the lower kiln center is occupied by the lined blast pipe and blast hood, so that all the lime has to pass through the outer circumference. The charge rests on bars; when these bars are removed the lime rolls into the lower compartment. The man doing the drawing can tell by the warmth of the lime to the touch how much he should draw. When the lime acquires a certain temperature he re-inserts the bars. There are four such drawing points around each kiln, for there are four charging pockets. These are not, however, located directly under one another. The lower chamber contains a conveyor, and so the lime passes through the plant into the railroad cars without any manual handling.

Fuel Efficiency—Labor Requirements and Production Cost

The fuel used in this case was both coal and coke about two portions of coke to one of coal. It was stated that coke gives the higher temperature, but for lime burning a mixture of the two is found to be cheaper. While the coal used is very low in volatile matter, still it tends to discolor the lime; not so much, however, that it cannot be sold satisfactorily. In this connection we should keep in mind that the European lime consumer is not so particular about lime appearance as the American.

This plant is located in a district where there are heavy deposits of good coal having a heat value of about 13,000 B.t.u. This coal cost, delivered, the German equivalent of $4 per ton, and the coke cost $5.50 per ton; very close to what the average lime burner has to pay over here. In other districts the coal is of lower grade; and generally speaking one can say that the fuel is more expensive in Germany, for a given heat content, than in the United States.

The stone is of high calcium carbonate content and the fuel consumption 20% of the lime drawn gives a ratio of 5 to 1, according to the American method of expression. To estimate kiln performance by the ratio, as is done over here, or by percentage,

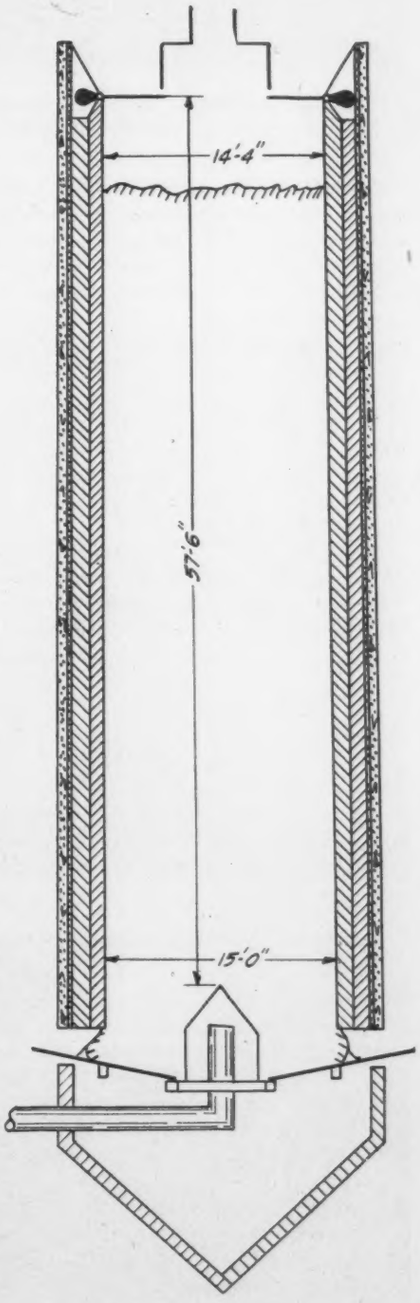


Fig. 30. Cross-section of one of the kilns having a capacity of 90 tons daily

Fig. 29. Automatic charging arrangement at the top of the two kilns

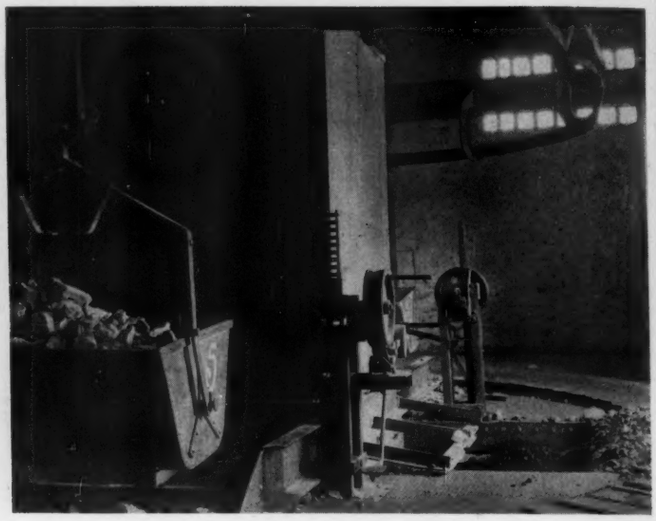


Fig. 32. Two of the kilns are charged from pockets which are filled directly from the monorail cars

which is the custom in Europe, is of course wrong. The only correct way is to actually state the amount of heat used in thermal units per pound of lime made; then there would be a direct comparison between plants using high grade coals and those using low grade bituminous coal or lignite.

While fuel can be assumed to be more expensive in Germany, the lime cost per ton including overhead in this plant was only about $2.50. That it was so low is partly due to the low wages paid to the men as compared with American practice; they use contract labor, and the highest wage paid is 18 cents per hour. In another lime plant the wages paid ranged from between 13 and 16 cents per hour. One can safely say that the average wage is only from one-fourth to at most one-third of the customary American wage. Of course, the living expenses are decidedly lower, but not at all in equal proportion; the general run of living necessities can be obtained for about half the American costs, but with wages at only one-fourth there is only enough left for luxuries to occasionally buy a glass of beer—no radios, victrolas, not even rocking chairs, much less flivvers.

With these high capacity kilns labor requirements are much lower; for example, in this plant of four kilns 10 men are employed per shift, while the output is over 300 tons per day. There is one foreman, two men are kept busy withdrawing stone from storage bins, four are employed in charging the kilns and three in drawing the lime and picking it to the extent that it is picked.

Substantial Housing of German Labor

What impresses one more than almost anything else in Germany is the tendency for attractive and permanent construction. One does not note the typical American frame house at all. This particular concern built some homes for their workmen (Figs. 33 and 34). They do look more like American bungalows and apartment buildings than homes built by a supposedly hard-hearted concern for their employes. Also the German's love of the soil is touching; gardens everywhere, and well kept; every home that has space has a garden. When a city is approached the train will be passing for long distances past so-called garden colonies, large tracts of ground divided and fenced into miniature gardens, many not larger than the size of a small room. These are rented to the city dweller, who comes out on Sundays and sometimes in the evening during the week, and plants and tends to his few vegetables or flowers with a care so loving that most Americans have no experience with the equal. This love of home and the general tendency towards permanency are what has reduced the German labor turnover to almost nothing. A man stays with a concern almost as long as the concern has need of him, and so he becomes more trained in his work than if he changed jobs continously, according to the more general American practice.

Hoennetal Quarry

The least one can say about this quarry is that it certainly is impressive. The lowest face is 230 ft. high; the highest and most worked face is 440 ft. high. This high face is worked in a peculiar sloping way (Figs. 35 to 37). The drilling and shooting are done at logical points on this slope, wherever foothold can be obtained, the intention, of course, is for all the stone to roll to the foot

Fig. 33. Homes for employes built by the Rheinisch Westphalischen Kalkwerke

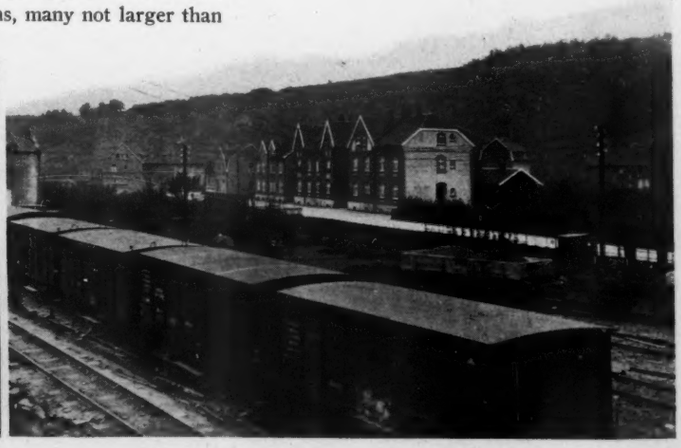


Fig. 34. The apartments shown in the picture were constructed by the company for its employes

Fig. 35. The quarry of the Hoennetal plant, showing the great height of the quarry face

of the face, where it is loaded with a steam shovel into dump carts, then taken to the crushing and screening plant, where it is prepared for the ring kiln or mixed-feed kiln, according to size, and into other smaller sizes.

The writer located a man high up on the face in an attempt to create a measuring stick, so the eye can appreciate the height, but the man loomed up so small that even in the original photographic print he can hardly be found.

The amount of stone quarried at Hoennetal is 2500 tons per day; the lime output is between 900 to 1000 tons; for this, in all, 400 men are employed, which includes quarry labor, kiln attendants, labor for the transportation system, crusher plant, etc. The number of workmen is, however, much higher than would be needed if it were not for the 10 ring kilns used. They require an equivalent of 8½ men per shift for 55 tons of lime per day, as compared with 10 men for 300 tons of lime output from the upright kilns—a tremendous difference indeed. While in a way it would be desirable now to describe the ring kilns employed in this plant, it probably is preferable to give the information gathered about mixed kilns before taking up other type kilns.

Fig. 36. Stone is loaded from the foot of the slope into the quarry cars

Forced Versus Natural Draft Mixed Kilns

Mixed-feed kilns were discussed with Director Ludowigs and some of his kilns were inspected. They are of the old natural draft type, and the normal output was around 50 tons per day. For a trial a fan was installed at one kiln, and the kiln base made tight with sheet metal; after the forced draft was applied the kiln capacity almost doubled. The fuel used was about 16% of low gas content coal and 4% of coke, of the weight of lime drawn, the ratio was therefore about 5 to 1, under the old method of operation. Fuel had a heat value of about 13,000 B.t.u.

Forced draft was not in use at this plant long enough to enable Director Ludowigs to state what effect it has on the fuel-lime ratio. It is unlikely, however, that with kilns 40 ft. in height there would be much of a reduction. It may more likely be, that by forcing, the ratio is improved, at least all American plants under the writer's observation improved the capacity and also increased fuel efficiency by using forced draft. As a further example, we should remember the extremely high capacity of Ruedersdorfer kilns, for their size, and the simultaneous high efficiency.

(To be continued.)

Sales of Phosphate Rock in 1927

THE TOTAL QUANTITY of phosphate rock sold or used by producers in the United States in 1927 was 3,166,102 long tons, valued at $11,234,863, according to figures compiled by the United States Bureau of Mines, Department of Commerce.

	Long tons	Value
Florida: Hard rock	131,254	$525,016
Land pebble	2,506,166	8,121,146
	2,637,420	$8,646,162
Idaho: Western rock	45,260	259,405
Tennessee:		
Blue and brown rock	477,172	2,300,296
Wyoming: Western rock	6,250	29,000
	3,166,102	$11,234,863

Florida continued to lead in production, and was the source of 83% of all the phosphate rock sold or used by producers in the United States in 1927. Land pebble rock constituted 95% of the Florida output in 1927 and showed a decrease of 3% in quantity and 1% in value, as compared with 1926; the average value f.o.b. mines was $3.24 a long ton in 1927, as compared with $3.17 a ton in 1926. The hard rock production in 1927 increased 13% in both quantity and value, as compared with 1926; the average value f.o.b. mines in 1927 was $4 a long ton, the same as in 1926. The production of phosphate rock in Tennessee in 1927 showed an increase in both quantity and value, as compared with 1926, and the average value a long ton was $4.82, as compared with $4.35 in 1926.

Fig. 37. To realize the height of this quarry, note the size of the man in the lower left corner

Imports of phosphate rock in 1927 were 28,195 long tons, valued at $292,871, or an increase of 62% in quantity and 52% in value, as compared with 1926. Exports amounted to 918,256 long tons, valued at $4,733,174, an increase of 23% in quantity and 7% in value, as compared with 1926.

The Air Analyzer for Determining the Fineness of Cement

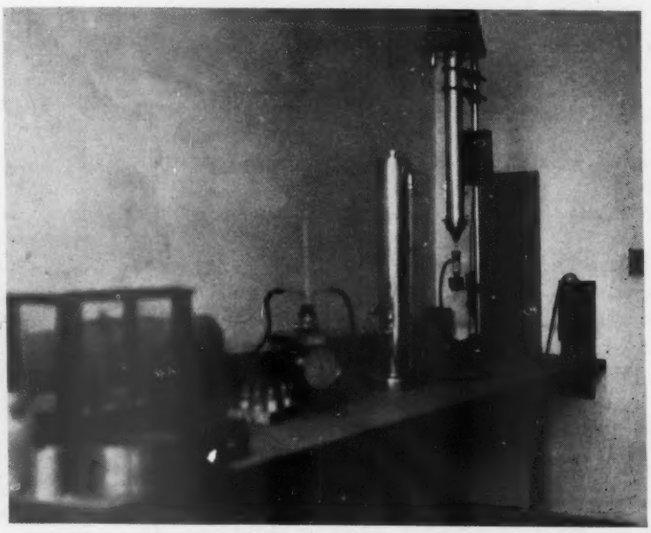
And Its Use at the Laboratory of the Lehigh Portland Cement Company

AS SOON AS RESEARCH MEN began to study the constitution and composition of portland cement and its behavior during hydration, setting and hardening, the need for an apparatus for determining the fineness of particles below the 200-mesh screen size developed. It was noted very early in the study of cements that fineness had a lot to do with their behavior, that merely regrinding ordinary portland cements produced a material that set and hardened altogether differently from the original product, and that the finest particles, separated by the crudest of methods, were quite different from the coarser particles.

Recent research has given a great impetus to the study of the fineness of cements, and a number of methods and devices for determining it have been evolved. Elutriation or sedimentation was the classic method used on soils and other fine powders, and the elutriation devices already in use were improved to where they would give accurate and constant results. An example is found in Dixon's elutriator described in ROCK PRODUCTS, November 12, 1927. Methods of determining the falling rate of fine particles in a liquid were devised, some of them very ingenious, so that the diameter of the particle might be computed from Stokes' law. An optical method was devised by an English investigator, the cement being held in suspension in a colloidal solution and its opacity determined. The finer the cement the greater the number of particles held in suspension and hence the greater the opacity. And with all these various forms of apparatus using air flotation or air elutriation were brought in.

Air Analyzers

A survey of these devices would indicate that the air analyzer developed at the U. S. Bureau of Standards by J. C. Pearson and W. S. Sligh is the most satisfactory device, both as a practical laboratory tool and a means of obtaining accurate results. The Bureau of Standards continues to use it in investigating and testing portland cements; the Portland Cement Association has one in its research laboratory, and the Lehigh Portland Cement Co. has recently installed one, which it is using in examining and testing its own and other products. This machine was designed by J. C. Pearson, who worked on the Bureau of Standards machine, and who is now with the Lehigh company. It represents the simplest and most efficient form that has been devised. A well-known firm that builds testing machinery is preparing to put it on the market in response to a demand from cement manufacturers, paint makers and others whose product is in the form of a fine powder.



Air analyzer for determining the fineness of cement

The advantage of this machine over sedimentation and elutriation devices is that it works on the dry powder and obtains dry products which can be chemically analyzed, studied under the microscope, and tested for setting and hardening (if they are cements). The advantage over other air separators is that it is much more accurate than most of them, and that it gives a number of sized products instead of only two. Its principal disadvantage has been that it was somewhat costly, but made as a commercial machine the cost can be brought down to where any good commercial laboratory can afford to buy it. It is quite possible that it may be used instead of a sieve for making the 200-mesh determination.

Principle of Air Analyzer

The principle of the air analyzer is that a current of air rising in a tube will lift particles of a size in proportion to its velocity. If the proportions of the tube are correct, the air current will lift all particles finer than a definite size and blow them out of the top of the tube, refusing to lift any coarser particles. It is precisely analogous to the work of an upward-current water classifier or an elutriation apparatus. But to insure constant and uniform results it was found that a great deal of care had to be taken to get a current which would be of definite velocity which would not vary throughout the time of setting.

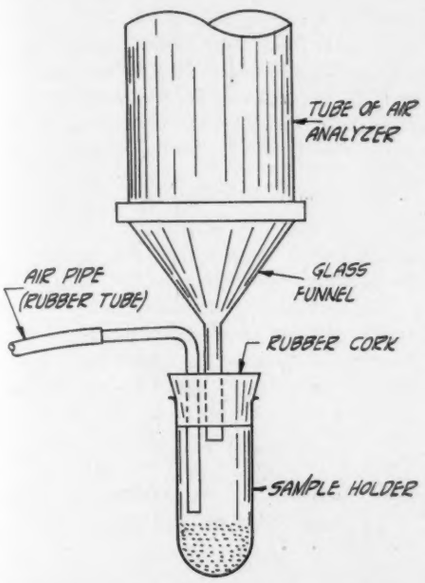
A great deal of preliminary work to secure this was done at the Bureau of Standards, and some of it, and a general description of the original machine, is to be found in "Technical Paper No. 48" of the Bureau of Standards. Unfortunately, this is now out of print, but there are copies of it in most libraries which collect scientific literature and in some public libraries.

The method chosen was to use air under constant pressure and to pass it through an orifice made to an exact area. From the pressure and the area the flow of air could be calculated by known formulas and the velocity of the tube current could then be figured. Measurements with a microscope of the particles separated by currents of different velocities were used to check the results attained with those which were calculated. It was found that the diameters of particles lifted followed Stokes' law (that the falling rate varied in proportion to the square of the diameter of the particle) up to a certain point and then it changed to what is called the "straight-line law"* by Dr. Martin and other investigators.

At the Lehigh Portland Cement Co.'s laboratory the air used comes from a line that is carried everywhere through the building from a receiver in the basement. This receiver is kept at 40 to 55 lb. pressure by an automatic pump, and the air flowing out of the receiver into the line is kept at 33 lb. by a pressure regulating valve which holds it

*See ROCK PRODUCTS, October 15, 1927 ("Air Separation Applied to the Fine Grinding of Rock Products"), for a discussion of these laws as given by Dr. Geoffrey Martin.

within 1 lb. As there is some variation on the line, the air going to the analyzer is first put into a small receiver and admitted to the machine through a pressure regulator. This regulator has a pipe through which excess air is valved off into a tube that dips into a



Details sample holder and connection

body of oil. There is always an excess pressure of air coming from the receiver, so there is no danger of the pressure falling below the working point. The receiver and air regulator "iron out" any fluctuation in the line pressure.

Operation of Lehigh Company's Air Analyzer

The air from the receiver goes first to a glass vessel in which is a hygrometer that can be read through its sides to show the amount of moisture in the air. It has been found that the machine works a little better when a moderate amount of moisture is present, and this is the usual condition. From this vessel it passes to a sort of flow meter designed by Mr. Pearson, which is a new feature and one which gives very satisfactory results.

The meter is a cylinder about 2 ft. high with a body of oil in the bottom to act as a diaphragm. The air goes in above this oil and comes out through a pipe about 1 in. in diameter near the top. From this it passes to a cylinder with a pipe union on both ends and passes through the regulating orifice, in this cylinder, to the pipe that leads to the analyzer tube, which is about ¼ in. in diameter. A branch from this leads to a glass tube on the side of the large cylinder which is connected with the oil in this cylinder. The tube has the pressure of the incoming air on the oil below and of the outcoming air above, and the oil stands in the tube at the height which measures the difference in pressures. With a given orifice, the volume of air delivered is definite and known for any difference in pressures of air used.

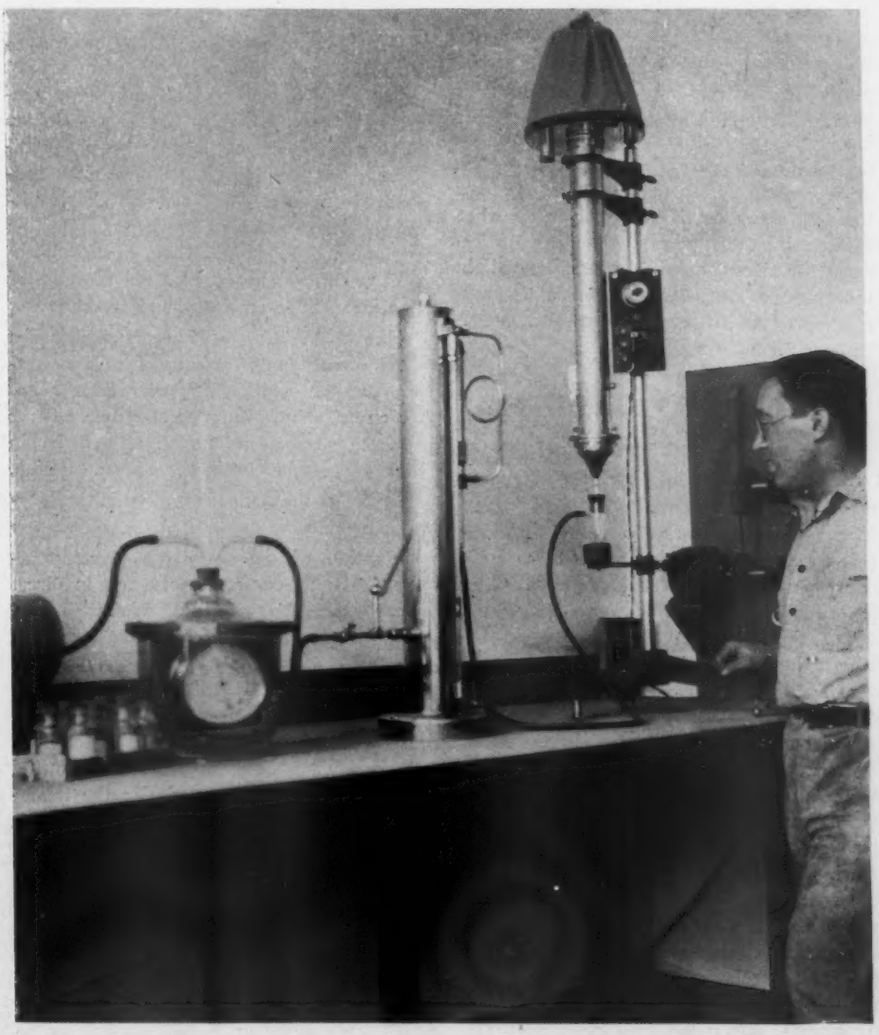
The orifice by which the outgoing air is regulated is simply a hole in a disk that can be changed for the different ranges in velocities. It makes an air-tight fit on the ledge on which it rests in the cylinder so that only the air that goes through the orifice can pass. Changing the velocity of the current is merely a matter of changing the differential pressure; if the desired change is outside the range of the orifice being used, it is only necessary to unscrew a union, take out one disk and put in another, with a larger or smaller orifice as may be required. The machine itself takes care of the other adjustments.

After passing the orifice the air goes through a rubber tube to the sample holder of the machine which is shown in the accompanying sketch. It is a sort of fat test tube with a pointed end, the mouth closed with a rubber cork. A tube through the cork admits air and another goes to the glass funnel at the bottom of the separating tube in which the work is done. The force of the air blows the cement into the funnel and the tube, and the particles that are too heavy to be lifted by the velocity of the current in the separating tube are held in the funnel until the air is shut off. Then they fall back into the sample holder.

The air separator tube is about 2.6 in. in diameter and 30 in. long, made of metal tubing. At the top it goes into a conical bag of a fabric that lets air pass but holds even the finest dust. This is closed at the bottom by a plate through which the separating tube passes, and if it is desired to collect the fine dust the bag is untied and it and the plate are brushed off, the dust falling through a hole that is closed by a screw cap when the machine is running.

The separating tube is clamped to a rod so that it can be moved up and down to get the right height for observation, and for ease in cleaning. This rod is on a heavy iron base provided with leveling screws, for it is very important that the tube should be level to avoid eddy currents in the tubes. On this rod is an electric tapper, like an electric bell hammer, which serves to minimize any tendency of the fine particles to stick to the side of the tube.

Messrs. Pearson and Sligh found that the



The air anaylzer for fineness of cement showing from left to right glass vessel containing hygrometer, flow meter and separating column on stand

separating tube should be at least eight times as long as the diameter, to avoid the effect of turbulence in the lower part, and Mr. Pearson thinks the length had better be ten times the diameter for safe working.

Analysis of Sample

The sizes of separation most commonly employed are 10μ (10 microns or 0.010 mm.), 20μ and 40μ, which are very approximately in geometrical progression with the standard sieve openings (No. 200, No. 100, etc.). As a rule the machine is adjusted for one of these separations, and from 5 to 10 grams of the sample are introduced and blown until a definite rate of loss (5 mg. per minute) is reached, which is considered the end point of the separation. From the weight of the residue the percentage blown off is calculated. For any other separation, the orifice is changed if necessary, the proper differential pressure secured, and a new sample introduced into the sample holder.

The element of time is important just as it is in screening, and the machine is run for just the length of time needed to make a separation which is considered complete.

Interesting exhibits are made by analyzing a cement and placing the sizes in a tube with a light cardboard disk between each size. The most noticeable feature of such a sample is the gradation in color. The top size, between 100-mesh and 200-mesh, is almost black, and the bottom, finer than 10μ, is almost white, the sizes between being lighter as they are finer. In many mineral products the very finest particles appear white when separated in this way. In the case of cement, the air-separated fractions show slight differences in chemical composition, the most marked of which is an increased SO_3 content in the finest fraction.

Suit Involves Unusual Title Situation

A SUIT brought by C. E. Todd against the Stewart Sand Co. of Kansas City, Mo., involves an unusual situation as to the title to land, but one that might come up in many places where sand and gravel plants are situated.

The Stewart Sand Co. brought out the Kaw River Sand Co., formerly owned by Mr. Todd and others, in 1925 and a part of the deal was a lease of land owned by Todd. This land was afterward taken by the Santa Fe railroad by right of eminent domain, but later released, as an appeal from the condemnation proceedings put the value of the land at more than the railroad would pay. During the time the railroad had the land the rent due under the terms of the lease was not paid nor were the taxes paid, it being acknowledged that the railroad owned it. On the release of the land Todd sued for the rent that was due and also to have the original sale of the Kaw River Sand Co. set aside on the ground that the terms of the lease had not been fulfilled.

Plans for Operating New Kentucky Consolidated Stone Co.

THE CRUSHED STONE PLANTS going into the new Kentucky Consolidated Stone Co. (see Rock Products, May 26, p. 75) produced more than 85% of all the crushed stone produced in Kentucky last year when the output was 1,200,000 tons, valued at more than $1,000,000. The new company, officials estimate, will bring this production up to 2,000,000 tons this year and put the quarry business of the state on a basis similar to that of the coal industry.

This will be achieved through discarding the old method of hand-to-mouth production of crushed stone, which has resulted in too much rock at times and not enough at others. Instead, rock will be quarried, crushed and stored, assuring a steady supply at all times from the 11 quarries located at strategic points throughout the state. Besides providing an ample supply of road material at all times, prices will be stabilized and delay in highway construction will be reduced to a minimum.

Actual operation under the new company began May 14, according to President A. J. Hoffman, who is one of the state's most noted highway builders. Others of the company's executive family consist of Dunlap Wakefield, chairman of the board of directors and member of the investment brokerage firm of E. W. Hays and Co., Louisville; Robert Cox, highway construction engineer of Lansing, Mich., vice-president and general manager; V. A. Morgan of Lansing, Mich., secretary and treasurer.

Ernest W. Ripy of Lawrenceburg, Ky., will be manager of production in the western division and Sam Parks Burnam of Richmond, Ky., who operates two of the biggest quarries in the state, will be in charge of production in the eastern division.

Offices of the company will be in the Heyburn building in Louisville.

Location of the company's plants, scattered over the state, as they are, in direct connection with railroads, highways and other users of crushed stone, are placed in such manner that they can supply needs of consumers with short railroad hauls, thereby cutting down considerably cost of highway construction. The plant are all in territory where it is probable the greatest amount of road building will take place in the immediate future as well as track ballast requirements of four of the most important railroads traversing Kentucky.

Pointing to some of the factors prompting organization of the consolidated company, President Hoffman said there are 70,000 miles of highways in Kentucky of which about 20,000 miles is classified as "surfaced" road; the remaining 50,000 miles is unimproved and not suitable for motor travel. Of the portion designated as "surfaced" highway at least 75% is in bad condition and in need of immediate repair.

The principal surfacing material used is crushed stone, and the resulting road is known as the bituminous or water-bound macadam type. The state highway commission will be forced to spend a large sum this year for repairing these roads. At this time there are more than 1400 miles of roads that are graded and drained but without any surface, the highway department in the past having contracted on the preparation of the grade rather than on the completion of the surface.

The intention this year is to surface as much of this road as possible, it is understood, and to spend a minimum amount on the grading and draining of the roads.

The Kentucky Consolidated Stone Co. will step production up to the limit, with eight-hour shifts to have available material for quick completion of the highway work.—*Lawrenceburg* (Ky.) *News.*

City Officials Organize Division of American Road Builders' Association

A CITY OFFICIALS' DIVISION of the American Road Builders' Association was organized at a meeting called for that purpose on June 8. The division will be devoted principally to the standardization of city street construction, operation and maintenance methods.

According to the association, millions of dollars can be saved the cities annually by the standardization of these methods. Examples were cited where the use of economical methods have reduced the cost of street construction in many instances by as much as 50%.

The great concentration of traffic in city areas makes a careful and thorough handling of city street affairs a matter of extreme importance.

The new division will operate by means of committees selected from the leading city officials of the country. These committees will study the various problems of city street construction, maintenance and operation and will report their findings at the 1929 convention and road show of the American Road Builders' Association. A special day will be set aside at this great annual convention for the discussion of city street affairs.

According to the association, approximately $400,000,000 annually is spent on city streets, or a sum equal to more than one-third of the annual construction and maintenance costs of the entire state and rural highway systems of the United States.

The new division will be the sixth to be organized by the association for the purpose of facilitating the economic construction and operation of roads and streets in North and South America.

New York State Crushed Stone Producers Meet Again at Syracuse

Continue Discussion of Credit and Discount Conditions

THE New York State Crushed Stone Producers Association is finding it difficult to establish uniform terms of credit and discount. It is trying to do this in conjunction with the organizations of the sand and gravel producers and the state highway contractors, and it was said at the recent meeting of the crushed stone producers, which was held in Syracuse, June 1, that no one of the three organizations had been able to agree on any definite arrangement which it cared to present to the other two.

The meeting of June 1, like its predecessor, was wholly given to discussion. A committee was chosen to prepare a resolution covering the matter in hand and the resolution was duly prepared and read, but the meeting voted to lay it on the table almost without discussion. At the same time, while no one had anything definite to offer that anyone else cared to second, the majority of the members approved the idea of a uniform system of credits and discounts and said they agreed with it, after the fashion of diplomats, "in principle."

The difficulty brought out by the discussion is that business is conducted through individual and personal relationships rather than by rules. One member said in substance: "If I have a customer who has bought of me for years, a man whom I know to be square and honorable, I am not going to refuse him an extension of credit when he asks for it, no matter what rule the association may adopt."

The Legal Aspect

Some of the members appeared to be in doubt as to whether or not the association could legally agree to maintain uniform terms of credit and uniform discounts. In order to bring this aspect of the matter before the meeting, John Rice asked what opinions as to the legality of such action had been secured. President Schaefer answered that he understood an informal opinion had been obtained from the proper sources by one of the interested organizations and that this opinion was that such action would be within the law. Another member said that his company had secured an opinion which was that the legality of such action on the part of the association was an open question. It depended on whether or not the court would hold that making terms of sale is the same thing as making a price. Mr. Rice then suggested that no definite plan should be adopted until it had been submitted to the state's attorney for an opinion of its legality.

One thing that seemed fair to everyone was that a contractor should pay for each month's receipts of stone from the "estimates" he receives from the state for that month. But to adopt that as a uniform rule had its difficulties. Estimates are made at varying dates, from the 18th to the 20th of each month, and checks issued at varying dates from the 27th to the 30th. The estimates do not cover work beyond the date of the estimate and sometimes two estimates are received in the same month. This makes it impossible to set a day for payment, as the 10th or the 15th of each month, which would be fair to everyone.

At the previous meeting a committee had been chosen to get the opinions of the various members on proper credit terms and discounts. President Schaefer as chairman of this committee said that he had sent out 37 questionnaires to companies (not individuals) and had received five replies. Four proposed terms that varied so much that they had practically nothing in common, and the fifth was non-committal. He proposed now that a letter ballot be sent out so that members could express their preference for one of four or five different sets of terms and discounts which the committee would formulate. The meeting took no action on this, although later it did vote to continue the committee and asked for a report at the next meeting.

After spending the morning session discussing various aspects of credits and discounts, it was voted to choose a committee to draw up a resolution during the luncheon hour to be presented to the meeting in the afternoon session. W. L. Sporborg, James Savage, L. J. Heimlich, J. H. Kaiser and John Rice were the committee chosen. The resolution presented said in effect that customers should be granted reasonable credits; that all bills incurred in any 30 days should be paid out of the estimates for that period; that a discount should be allowed on bills paid within 15 days of their dates; and that the gross bill (without discount) should be paid before the end of 30 days from its date; and, finally, that these terms should go into effect January 1, 1929.

The resolution was laid on the table to be taken up at the next meeting.

Discuss Car Cleaning and Repairing

President Schaefer read a communication from Secretary Boyd of the National Crushed Stone Association enclosing a questionnaire, copies of which were to be sent to all members. This questionnaire has to do with the cost of cleaning and repairing cars. The same or equivalent questionnaires are being sent to sand and gravel producers by their national organization. The purpose is for the two associations to work together, to see if something cannot be done to reduce an expense which now exceeds $1,500,000 annually.

President Schaefer said that at one of the General Crushed Stone Co.'s plants as many as six men had been employed for a part of last season cleaning and repairing cars. Cars were received which had from six inches to a foot of fine coal and sometimes they contained a lot of manure or rubbish, so much that it cost money to dispose of it as well as to clean the cars.

Mr. Rice said that this was a matter that shippers' advisory boards had taken up with the railroads repeatedly. It was the duty of the consignee to clean cars after unloading them, but the railroads had not found a good way to compel consignees to attend to this duty. Instead of cleaning cars, many consignees after unloading cars dumped in a lot of trash that had been accumulated around the plant, thus compelling the railroads to assist them in keeping their yards clean. Old crates and other rubbish was often left in the cars after machinery and automobiles had been unloaded. He said that the railroads could be legally compelled to clean and repair cars, but if shippers refused to receive cars on account of dirt or bad condition, shipments would be delayed, so the shipper made the best of a bad situation. The matter was one that needed some study and a proper presentation to the railroads by the national associations, and he hoped that every member would fill out the questionnaire.

Condition of Brakes

Ernest Hendricks said that his company's plant (Albany Crushed Stone Co.) was on a hillside and three rather serious accidents had occurred from the brakes of cars being in bad condition. He said he would like to have the condition of brakes included in any request that might be made to the railroads to supply cars in better condition.

It was voted to hold the next meeting in New York City and ROCK PRODUCTS was requested to publish this fact and to request all New York stone producers to be present.

The companies represented and those representing them at the meeting were:

General Crushed Stone Co., John Rice, George Schaefer (president of the association) and Grover Murphy.
Buffalo Crushed Stone Co., James Savage, A. J. Hooker and F. W. Schmidt.
Solvay Process Co., J. H. Kaiser and L. J. Crate.
Leroy Lime and Stone Co., L. J. Heimlich, D. L. Moore and D. E. Moore.
Rock-Cut Stone Co., W. L. Sporborg, A. G. Seitz and F. C. Owens (secretary of the association).
Watertown Stone Products Co., S. B. Ormsby.
Wickwire-Spencer Steel Co., W. E. Foote.
Dolomite Products Co., Arthur Sickles.
Peerless Quarries Co., A. S. Owens.
Albany Crushed Stone Co., Ernest Hendricks.

The guests were William Anderson, Hercules Powder Co., and Edmund Shaw, ROCK PRODUCTS.

Whiting Industry in the United States

Chalk or Whiting or Paris White—Dry Ground, Bolted or Precipitated—Costs of Manufacture and Uses of Imported and Domestic Product—Substitute Material

IN CONNECTION with a public hearing, to be held in the office of the United States Tariff Commission, Washington, D. C., June 20, 1928, much data has been collected by the commission in regard to the whiting industry in this country. Although the number of producers, or manufacturers, of whiting at the present time is not large, every limestone producer is likely to be more or less interested in the outcome of this hearing, at which the desirability, or necessity, of increasing the duty on imported whiting for the protection of the home industry, will be considered.

Questions for Discussion at Hearing

The attention of interested parties is especially directed to the following questions:

Whiting—(1) Are the periods (*a*) 12 months of 1926 for domestic costs, and (*b*) the first six months in 1927 for Belgian costs representative for purposes of a cost comparison? (2) What is the principal wholesale market, or markets, in the United States for imported and for domestic whiting? (3) Are there any significant differences in the quality of (*a*) low grade domestic and imported whiting; (*b*) medium and high grade domestic and imported whiting?

Precipitated Chalk—(1) Is 1926 a representative year for the purposes of a cost comparison? (2) Is the domestic and the imported article comparable in quality for use in: (*a*) Tooth paste and tooth powder. (*b*) Cigaret and other tissue papers. (*c*) Medicinals. (*d*) Other products.

Rates of Duty on Whiting or Ground Chalk

Whiting has been dutiable under the last three general tariff acts as follows:

Act of 1922, paragraph 20. Chalk or whiting or paris white; dry, ground, bolted or precipitated, 25% ad valorem; * * *.

Act of 1913, paragraph 60. Whiting and paris white, dry and chalk, ground or bolted, 1/10 c. per lb.; * * *.

Act of 1909, paragraph 54. Whiting and paris white, dry, ¼ of 1 c. per lb; * * *.

Act of 1909, paragraph 13. Chalk, when ground, bolted, precipitated, naturally or artificially, or otherwise prepared, * * * 1c. per lb.; * * *.

History of the Investigation

On May 26, 1927, the tariff commission instituted an investigation of whiting for the purposes of section 315 of the tariff act of 1922. An application for an investigation looking toward an increase in the duty on whiting was received from the Taintor Co., 75 West street, New York, N. Y., on February 18, 1927. From July to November, 1927, the commission obtained domestic cost data from the five companies engaged in the production of whiting for sale. In August and September of that year representatives of the commission's staff obtained foreign costs from two of the four manufacturers of whiting in Belgium.

Description and Uses

Whiting, commonly known as chalk whiting, is a white, powdery substance obtained by the mechanical reduction of lump chalk, the latter being a native variety of calcium carbonate. Chalk is a noncrystalline, soft, friable, finely granular form of limestone composed for the most part of microscopic shells of marine life.

The important uses of whiting are: (1) In the manufacture of calcimine; (2) in the manufacture of rubber goods as a filling or compounding material; (3) in the manufacture of putty. It is used also in making linoleum, pottery, oil paints, molded articles, such as picture frames, in insulated wire and cable and in numerous minor ways.

Raw Materials and Its Sources

The raw material used in the production of practically all the whiting manufactured in the United States is chalk, which is imported, chiefly from France and England, and is duty free. A small quantity of fine-quality whiting is made from a variety of chalk called "cliffstone," which is imported exclusively from Hull, England. Both English and French chalks contain "flints" and sand as foreign matter, and an amount of moisture varying with weather conditions at the time of loading and unloading.

Table 1 shows imports of unmanufactured chalk by countries of origin.

Prior to 1927, domestic deposits of chalk of a quality suitable for the manufacture of whiting were not worked on a commercial scale. It is reported that a deposit in the chalk formation at Whitecliff, Ark., said to have the same characteristics as English and French chalks, is now being developed for the production of whiting to be used in the paint, putty and rubber trades.

By-products

No by-products are obtained in converting chalk to whiting other than flints and a small amount of sand. Neither the sand nor the flints have a marketable value and both are disposed of as waste.

Domestic Production and Consumption

Size of the Industry—The first domestic whiting plant was established about 80 years ago at Philadelphia, and production was started shortly after at New York City. Until 1920, practically the entire consumption of whiting was supplied by domestic manufacturers.

In 1926, the year for which cost of production data were obtained, five companies were manufacturing whiting for sale. Four of them each operate one plant; the other runs two plants. The six plants have a combined capacity of about 88,000 short tons per year, and in 1926 produced nearly 58,000 tons. Six additional companies, with an estimated annual capacity of 39,000 tons, manufacture chalk whiting; these companies, however, manufacture for their own consumption only.

The combined value of fixed assets taken at book costs (as of December 31, 1926) less depreciation for the six domestic plants of the five firms producing whiting for sale, for which costs of production were obtained, was slightly under $1,000,000.

Location of Plants—The six plants that produce whiting for sale are located as follows: Three at Boston; one at Bayonne, N. J.; one at Philadelphia, and one at Camden, N. J. Of the six plants that manufacture whiting for their own consumption, three are located at New York City; none at Carteret, N. J.; one at Philadelphia, and one at Berkeley, Calif.

TABLE 1.—CHALK, UNMANUFACTURED: GENERAL IMPORTS INTO THE UNITED STATES, FROM PRINCIPAL PRODUCING COUNTRIES* (QUANTITIES IN LONG TONS)

(Calendar years)	1913†		1922		1923		1924		1925		1926	
Imported from—	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
United Kingdom	91,580	$71,364	78,288	$120,611	64,660	$100,294	61,161	$84,539	48,019	$73,899	63,035	$93,857
France	56,305	43,844	37,398	43,735	49,758	57,481	41,112	37,495	46,075	37,082	36,165	30,474
Mexico	1,689	3,750	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belgium	400	419	5,141	9,849	3,464	12,484	3,908	7,629	3,572	6,584	5,061	10,319
Other countries	1,035	672	100	183	5,101	5,471	900	1,438	‡4,991	3,343	595	478
Total	151,009	$120,049	120,927	$174,378	122,985	$175,730	107,081	$131,101	102,657	$120,908	104,856	$135,128

*From Foreign Commerce and Navigation of the United States. †Fiscal year. ‡From Germany.

Method of Manufacture—The first operation is the wet grinding of the lump chalk in edge runner mills, to which the chalk is delivered in tram cars or wheelbarrows. Complete mechanical handling of the raw material is not feasible, because the flints must be separated by hand picking, done as the material is transferred to the tram cars and into the grinding mills.

Water is run into the mills at a rate that permits the formation of a milk-like suspension. This liquid overflows from the grinding mill into the first unit of a group of settling tanks which overflow into each other. The grit and coarser chalk particles are deposited in the first (head-end) tanks, and material of increasing fineness and freedom from grit in the last (tail-end) tanks. The settling is operated to yield different grades of whiting, varying in fineness: "Commercial" from the first (head-end) tanks, gilders or extra gilders (or both) from the intermediate tanks, and paris white from the last (tail-end) tanks. A certain amount of sand accumulates in the first (head-end) tanks which is disposed of as waste. The overflow water from the last tank is returned to the chalk grinders.

The whiting sludge is pumped from the settling tanks and dewatered, either by a filter press or by evaporation of the bulk of the water in open pans. The partially dry material is then transferred to drying chambers where, in one to four weeks, it is reduced to a bone-dry condition. The dried material is passed through a disintegrating and bolting machine, and the finished whiting is then mechanically packed into bags or barrels for shipment. The usual container is a burlap bag of 50 or 100 lb. capacity.

At some of the domestic plants certain equipment of a type first used in ore dressing operations has been recently introduced for the settling, dewatering and final drying of the whiting. In plants operating by that system, the liquid containing the suspended chalk from the grinding mill is delivered to a machine known as a classifier, in which the coarser material, such as sand and larger particles of chalk, settles and is mechanically removed. The residue is then delivered to a pebble mill for further grinding. The finer material in suspension overflows from the top and is pumped to a thickener in which the bulk of the water is separated. The chalk collects as a sludge in the thickener and is delivered to a continuous filter for dewatering.

The water that overflows from near the top of the thickener, and which drains from the continuous filter, is returned to the grinders. The filter cake drops into a conveyor that delivers it to a rotary dryer, from which it is discharged, bone dry, into a conveyor that delivers it to a disintegrating and bolting machine for finishing as previously described. A certain amount of sand that collects in the classifier is removed from time to time and disposed of as waste.

The new type of equipment yields only one grade of whiting at a time; in order to produce more than one grade simultaneously two or more complete units must be installed. One outstanding advantage of the new equipment is the large reduction in the time required for processing. It operates automatically, and thus requires less labor than the other type of equipment. The principal disadvantages are the larger investment and the increased maintenance expense.

The reduction of chalk to whiting is accompanied by a shinkage of about 20% in weight. By far the greater part of this loss is due to the elimination of the moisture present in the crude chalk.

Production and Consumption

Complete official returns on the production of whiting are not available. Data collected by the commission on the total sales in the period 1922 to 1926 by firms engaged in the manufacture of whiting for sale show that the total domestic sales of domestic whiting ranged from a minimum of 136,000,000 lb. in 1923 to a minimum of 110,000,000 lb. in 1926. The estimated annual production of the six companies known to manufacture whiting for their own consumption amounts to about 78,000,000 lb.

Imports in 1926 amounted to 62,707,306 lb. and exports were relatively small. Apparent consumption amounted to about 251,000,000 lb.; assuming consumption to equal domestic sales plus imports less exports, the imports amounted to 25% of the apparent consumption, to 33% of the total production, and to 56% of the production for sale.

Table 2 shows the total sales of whiting for the years 1922 to 1926, inclusive, produced by the five companies now engaged in its production for sale and the imports for consumption.

TABLE 2.—WHITING: DOMESTIC SALES AND IMPORTS

	Domestic sales*		Imports†	
Year	Pounds	Value‡	Pounds	Foreign value
1922	122,520,501	$1,413,720	34,533,952	$228,552
1923	136,181,390	1,573,698	53,670,371	259,152
1924	116,908,021	1,309,258	60,384,607	266,215
1925	120,475,620	1,335,015	63,490,408	304,623
1926	110,679,565	1,098,586	65,839,833	273,045
1927	.....	.....	63,630,000	199,937

*One plant was idle throughout 1922, 1923 and 1924 and operated only four months in 1925.
†Includes precipitated chalk in the period 1922-1926.
‡At works packed.

From the foregoing table (No. 2) it appears that the unit values per pound for the several years shown were:

Domestic sales: 1.15c, 1922; 1.16c, 1923; 1.12c, 1924; 1.11c, 1925; 0.99c, 1926.
Foreign value of imports: .66c, 1922; .48c, 1923; .44c, 1924; .48c, 1925; .42c, 1926; .31c, 1927.

Competitive or Substitute Products—Ground Limestone

Whiting substitute or limestone whiting, and the by-product precipitated chalk, are the two principal substitutes for chalk whiting in certain of its uses.

Whiting Substitute—The interruption of ocean transportation and the heavy demand for whiting during the World War resulted in the substitution of ground limestone for chalk whiting for certain uses in the United States. This substitution has increased since the termination of the war. Whiting substitute is obtained by the grinding of domestic limestone or of marble and is used chiefly in the manufacture of paints and rubber goods. Some manufacturers purchase their limestone, while others quarry their entire requirements. The production of limestone, sold or used for the production of limestone whiting, has been reported since 1916 in Mineral Resources of the United States.

Information obtained by the commission from manufacturers of whiting substitute shows a production in 1926 of 84,920 tons valued at $651,957, or a unit value of $7.79.

Table 3 shows the quantity of limestone sold for or used from 1916 to 1925 in the production of limestone whiting.

TABLE 3—LIMESTONE SOLD FOR OR USED IN THE PRODUCTION OF LIMESTONE WHITING IN THE UNITED STATES
(From Mineral Resources of the United States)

Year	Quantity Short tons	Year	Quantity Short tons
1916	24,722	1921	29,560
1917	34,983	1922	66,200
1918	43,011	1923	81,310
1919	73,771	1924	66,910
1920	60,890	1925	82,290

The production reported in 1925 was from the following states: Arkansas, California, Georgia, Illinois, Massachusetts, Michigan, Missouri, Nebraska, New Jersey, Ohio, Pennsylvania and Tennessee.

By-product Precipitated Chalk—Precipitated chalk is obtained as a by-product in chemical operations, principally from the preparation of caustic soda from soda ash and lime. Precipitated chalk contains a fraction of 1% of alkali, which limits its application. The principal use is in the rubber trade. The production of by-products precipitated chalk for use as a substitute for whiting began during the war; three plants are known to the commission to manufacture for sale. Two of these are located in Ohio and one in Pennsylvania. The annual output is estimated at 65,000 tons.

Foreign Production

Belgium, France and England are the principal foreign producers of whiting; of the three, Belgium is the largest exporter to the United States. Four companies are engaged in the production of whiting in Belgium; each company obtains the crude chalk from its own quarry. One of the four is a large producer of cement, another a large producer of chemicals and the other two are primarily engaged in the production of whiting. The estimated aggregate capacity of the four Belgian plants is 100,000 short tons per year.

Imports—Imports of whiting prior to 1920 were relatively small; they increased from a total in 1920 of 20,304,893 lb., valued at $238,304, to 63,630,000 lb., valued at $199,937, in 1927.

Table 4 shows the total annual imports of whiting into the United States for con-

TABLE 4—WHITING OR PARIS WHITE, DRY, AND CHALK, GROUND OR BOLTED: IMPORTS FOR CONSUMPTION[1]

Year	Rate of duty	Quantity, lb.	Value	Value per unit of quantity	Duty collected	Actual and computed ad valorem, per cent
1913	1/4c per lb.[2]	3,536,747	$14,032	$0.0040	$8,842	63.01
1919	1/10c per lb.[3]	1,759,588	18,358	.0104	1,760	9.58
1920	1/10c per lb.	20,304,893	238,304	.0117	20,305	8.52
1921	1/10c per lb.	19,781,851	151,572	.0077	19,782	13.05
1922[4]	1/10c per lb.	21,742,365	148,746	.0068	21,742	14.62
1922[5]	25%	12,791,587	79,806	.0062	19,952	25.00
1923	25%	53,670,371	259,152	.0048	64,788	25.00
1924	25%	60,384,607	266,215	.0044	66,554	25.00
1925	25%	63,490,408	304,623	.0048	76,156	25.00
1926	25%	65,839,833	273,045	.0041	68,286	25.00
1927	25%	63,630,000	199,937	.0031	49,984	25.00

[1] Import figures from September 22, 1922, to December 31, 1926, include precipitated chalk, statistics of which are shown separately beginning June 1, 1927. An analysis of the invoices for 1926 shows that the imports during that year amounted to 3,132,527 lb., valued at $90,114.
[2] Under the tariff act of 1909, fiscal year.
[3] Under the tariff act of 1913.
[4] January 1 to September 21, inclusive.
[5] September 22 to December 31, inclusive.

sumption in the year 1913, and from 1919 to 1927.

Principal Sources of Imports—Table 5 shows the combined imports of whiting, or paris white . . . and of chalk, ground, bolted or precipitated, by countries, from January 1, 1923, to December 31, 1926, inclusive. The figures for 1927 do not include precipitated chalk. Belgium is the principal source of imports both with respect to quantity and value. In 1923 and 1924 about 50% of the imports came from Belgium; the proportion increased to 55% in 1925, 57% in 1926, and 69% in 1927. France ranks second in order of importance; the imports by quantity from that country made up about one-third of the total during the years 1923-1926.

Prices

Table 6 shows the spot wholesale prices of whiting, by grades, during 1913, and from January, 1922, to January, 1928, inclusive, as quoted in the *Oil, Paint and Drug Reporter*.

Table 7 shows for January 1, 1922, to June 30, 1927, the weighted average selling prices of the whiting sold by all domestic firms manufacturing for sale. These include all firms from whom cost data were obtained.

Grades

Both the color and the quality of whiting are important in some uses. The quality depends chiefly on its fineness and freedom from grit. A certain amount of gritty material is desirable, however, in whiting used for the manufacture of putty. The grade known in the domestic trade as commercial is practically all consumed in putty.

The following grades are included in the market quotations on whiting in the *Oil, Paint and Drug Reporter:* Commercial, gilders', extra gilders', paris white, and English cliffstone paris white. There are no generally accepted standards for the different grades; the terms are loosely used in the trade, and sales are largely made by sample. The commercial is the cheapest and English cliffstone paris white the most expensive grade.

Representative samples of each grade manufactured were obtained by the commission from all the domestic producers making whiting for sale. Samples were also obtained from the principal importers of the whiting imported by each; samples of the whiting imported from Belgium were obtained from customs officials and from the Belgian manufacturers from which cost data were obtained.

The result of tests made on these samples at the Bureau of Standards for the percentage by weight of each that is retained on a 325-mesh sieve shows that the amount of coarse material decreases in the following order of grade in the products of each of the domestic manufacturers: commercial, gilders', extra gilders' and paris white. There is, however, a variation in the fineness of a given grade as produced by the different manufacturers. A study of the relative grades indicates that there are no exact and accepted standards for each grade by the trade.

The imported whiting shows a similar variation in the percentage of coarse material as indicated by the sieve tests. In the imported article sold for the putty trade, corresponding to the commercial grade, there is a somewhat smaller percentage of coarse material. The imported whiting sold for uses to which the domestic gilders, extra gilders and paris white are commonly put shows relatively the same quantity of coarse material as that used in the domestic. Imported whiting is largely sold by sample rather than by grade. Different consumers

TABLE 6—WHITING: WHOLESALE, SPOT, PRICES, BY GRADES, IN NEW YORK MARKET, AS QUOTED IN "OIL, PAINT AND DRUG REPORTER"

Date	Whiting (cents per pound) Commercial*		Gilders	Extra gilders	Paris white	English cliffstone
1913—January	0.45-0.50		0.55-0.65	0.55-0.68	0.70-0.75	0.75-1.10
April	.45- .50		.55- .65	.55- .68	.70- .75	.75-1.10
July	.45- .50		.55- .65	.55- .68	.75- .75	.75-1.10
October	.45- .50		.55- .65	.55- .68	.70- .75	.75-1.10
1922—January	1.15-		1.20-1.35	1.30-1.40	1.35-1.45	1.75-2.00
April	1.15-		1.20-1.35	1.30-1.40	1.35-1.45	1.75-2.00
July	1.10-		1.15-1.25	1.25-1.35	1.35-1.45	1.70-1.90
October	1.00-		1.10-	1.15-	1.25-	1.50-
1923—January	1.00-		1.10-	1.15-	1.25-	1.50-
April	1.00-		1.10-	1.15-	1.25-	1.50-
July	1.00-		1.10-	1.15-	1.25-	1.50-
October	1.00-		1.10-	1.15-	1.25-	1.50-
1924—January	1.00-		1.10-	1.15-	1.25-	1.50-
April	1.00-1.15		1.10-1.20	1.15-1.35	1.25-1.50	1.50-
July	.85-1.15		1.10-1.20	1.15-1.35	1.25-1.50	1.50-
October	.85-1.15		1.10-1.20	1.15-1.35	1.25-1.50	1.50-
1925—January	1.00-1.15		1.25-1.35	1.40-1.50	1.25-1.50	1.50-
April	1.00-1.15		1.25-1.35	1.40-1.50	1.25-1.50	1.50-
July	1.00-1.15		1.25-1.35	1.40-1.50	1.25-1.50	1.50-
October	1.00-1.15		1.25-1.35	1.40-1.50	1.25-1.50	1.50-
1926—January	1.00-1.15		1.25-1.35	1.40-1.50	1.25-1.50	1.50-
April	1.00-1.15		1.25-1.35	1.40-1.50	1.25-1.50	1.50-
	Domestic	Foreign				
July	1.00-	0.85-1.00	1.25-1.35	1.40-1.50	1.25-1.50	1.50-
October	1.00-	.85-1.00	1.25-1.35	1.40-1.50	1.25-1.50	1.50-
1927—January	1.00-	.85-1.00	1.25-1.35	1.40-1.50	1.25-1.50	1.50-
April	1.00-	.85-1.00	1.25-1.35	1.40-1.50	1.25-1.50	1.50-
July	1.00-	.85-1.00	1.25-1.35	1.40-1.50	1.25-1.50	1.50-
October	1.00-	.85-1.00	1.25-1.35	1.40-1.50	1.25-1.50	1.50-
1928—January	1.00	.85-1.00	1.25-1.35	1.40-1.50	1.25-1.50	1.50-

*It is assumed that these prices are primarily for the domestic production, no mention of foreign being made prior to July, 1926.

TABLE 7—WHITING: WEIGHTED AVERAGE SELLING PRICES OF DOMESTIC SALES FOR PRODUCERS* MANUFACTURING FOR SALE

Year	Unit value (cents per pound)
1922	1.1226
1923	1.1134
1924	1,0841
1925	1,1081
1926	.9926
1927†	.9820

*These include all producers from whom cost data were obtained.
†First six months.

TABLE 5—WHITING OR PARIS WHITE, DRY, GROUND, BOLTED OR PRECIPITATED, AND CHALK, GROUND, BOLTED OR PRECIPITATED: IMPORTS BY COUNTRIES[1]

Imported from	1923 Quantity, lb.	1923 Value	1924 Quantity, lb.	1924 Value	1925 Quantity, lb.	1925 Value	1926 Quantity, lb.	1926 Value	1927 Quantity, lb.	1927 Value
Belgium	25,964,700	$78,907	32,456,110	$92,529	34,891,895	$104,159	[2]37,450,147	[2]$95,835	43,814,000	$121,770
France	17,965,891	52,438	17,300,520	53,786	19,122,845	56,525	19,407,387	50,687	14,856,000	46,163
United Kingdom	[3]4,663,863	[3]90,868	2,588,696	75,918	3,579,070	105,588	3,506,425	90,775	434,000	3,823
Denmark	3,248,510	16,551	6,017,497	25,816	4,855,962	26,488	[4]2,508,476	[4]15,632	2,474,000	17,685
Germany	1,004,593	9,265	711,004	11,311	839,308	10,176	517,006	7,582	80,000	798
Sweden	10,956	45	.....	.....	100,227	476	1,888,902	8,413	1,862,000	8,758
All other countries	150,907	8,157	205,864	1,398	101,101	1,211	561,490	4,221	110,000	940
Warehouse withdrawals[5]	550,721	2,549	1,104,916	5,457	.....	.....	.....	.....	.....	.....
Total	53,560,141	$258,780	60,384,607	$266,215	63,490,408	$304,623	65,839,833	$273,145	63,630,000	$199,937

[1] The imports for 1927 are exclusive of precipitated chalk. [2] Includes Luxemburg. [3] England only. [4] Includes Faroe Islands.
[5] Not shown separately after 1924.

use different grades for the same purpose, and for many uses considerable variation in the grade is permissible. Until definite standards are established for each grade and until they are generally adopted, comparison of the various types by grade does not appear feasible.

Table 8 shows the sales by grades of domestic whiting for the calendar year 1926. The figures were obtained from the five domestic manufacturers producing whiting for sale, i.e., the five covered by the cost inquiry.

TABLE 8—WHITING: DOMESTIC SALES, BY GRADES, 1926

Grade	Quantity, lb.	Value	Unit value
Commercial	24,585,440	$222,295,28	$0,009041
Gilders	17,638,740	168,252.57	.009538
Extra gilders	35,085,400	348,980.25	.009946
Paris white	33,369,985	359,058.19	.010759
Total	110,679,565	$1,098,586.29	$0.009925

Costs of Production

UNITED STATES—From July 5 to November 29, 1927, representatives of the commission obtained from the five domestic companies producing whiting for sale, cost of production data, which were in each instance checked to the books of record. For four of these companies the data obtained were for the calendar year 1926, and for the other company they cover the period December 1, 1925, to November 30, 1926. The cost data of all five companies were used in calculating the weighted average domestic cost.

Because of the inadequacy of the cost data of the companies producing whiting for their own consumption, costs for such firms are not included in the commission's cost data.

BELGIUM—During August and September, 1926, representatives of the commission obtained costs of production data from the two Belgian companies manufacturing whiting as their main and practically only output. The cost data obtained from one of these companies are for the calendar year 1926 and the first six months of 1927. The cost data obtained from the other company are for the first six months of 1927; and the comparison of foreign and domestic costs is based on the weighted average costs of the two companies for the latter period.

Comparison of Costs of Production in the United States and Belgium

The only comparison possible to make in a statement of information that will not disclose the confidential operations of the individual manufacturer is a comparison of domestic and foreign cost items in percentages. Table 10 shows each item of cost in Belgium expressed as a percentage of the weighted average cost of the similar item in the United States.

An attempt was made to determine the cost of the various grades of domestic whiting, but no satisfactory method has been found for determining such costs.

Raw Material—In Belgium the raw material, chalk, is obtained from quarries operated by the whiting manufacturers, and located adjacent to the plants. The cost of the raw material is made up of two items, the cost of quarrying the crude chalk, and a depletion or a royalty charge on the chalk deposits.

All crude chalk produced in the United States is imported and comes chiefly from France and England. Transportation charges on the crude chalk make up over 50% of its landed cost at domestic plants.

The raw material charge in Belgium amounts to 5.82% of the total cost of production, as compared with 30.25% in the United States.

General and Administrative Costs—The general overhead for Belgian plants is allocated between whiting and crude chalk and lime, according to the ratio of the value of sales of these products. The sale of crude chalk and lime, however, made up a very small part of the total sales of the two companies from which cost data were obtained. All items of selling expense have been deducted from general and administrative expense for both foreign and domestic companies. In the United States, the five companies from which cost data were obtained produce whiting only, so that no adjustments or allocations were necessary.

The figure for depreciation in both the domestic and foreign costs is based on the original cost value. One domestic company rented its plant and no depreciation charge was allowed, the rent charged being used in lieu of depreciation. Another domestic firm carried no depreciation charge on its books; the rate used was that of two companies using similar types of equipment. The average rate for buildings and equipment for the domestic plants was 5.58%.

Depreciation was not charged on the books of either of the Belgian plants for which costs were obtained. For them, depreciation of domestic plants for which such data were available were used. The depreciation on buildings for the Belgian plants was calculated at 3% and for equipment at a rate of 8½%.

Imputed interest for both domestic and foreign costs was calculated on the depreciated original value of buildings and equipment.

TABLE 10—WHITING: COSTS OF PRODUCTION IN BELGIUM EXPRESSED AS PERCENTAGES OF COST IN THE UNITED STATES, COSTS

Item	United States 1926	Belgium 1927, first 6 mo.
		Per cent
Raw material	100	5.10
Factory expense—		
Labor, including superintendence	100	21.81
Repairs and maintenance	100	43.21
Containers	100	83.76
Power and coal or coke for drying	100	60.10
Supplies and miscellaneous	100	10.95
Total factory expenses	100	40.36
General and administrative expense—		
Officers' salaries	100	5.06
Office salaries and expense	100	33.91
Depreciation	100	32.50
Insurance and taxes	100	23.18
Miscellaneous	100	44.74
Total general and administrative expense	100	22.64
Total cost of production	100	25.91
Imputed interest	100	74.27
Total cost of production, including imputed interest	100	28.42

The rate used for imputed interest in the Belgian costs is 7%, which approximates the yield of standard long-time bonds in Belgium in 1927.

Marketing and Transportation

Manufacturers of whiting in the United States sell most of their output directly to the consumers. Imported whiting is purchased outright by the importers and most of it is sold by them direct to the consuming trades. Some of the imported whiting is warehoused, but most of it moves direct from dock to consumer. A relatively small amount of both the domestic and imported is sold to jobbers. There are no important differences in the methods of marketing the domestic and the imported article.

Ports of Entry of All Whiting—Information on the imports of whiting by ports in 1926 was compiled by the commission from consular invoices covering over 53,000,000 lb. New York is the leading port, 29,702,566 lb. or nearly 56% of the total imports entering through that city; Boston ranks second, with 8,014,469 lb. or 15% of the total; and Philadelphia, third, with 6,095,200 lb. or nearly 12%; about 11% was entered by the way of Pacific ports. Table 11 shows the imports of whiting in 1926 by ports.

TABLE 11—WHITING: IMPORTS DURING 1926, BY PORTS OF ENTRY

Port of entry	Quantity, lb.	Pct. of total
New York	29,702,566	55.9
Boston	8,014,469	15.1
Philadelphia	6,095,200	11.5
Los Angeles	2,563,226	4.8
San Francisco	2,307,002	4.3
Baltimore	1,596,534	3.0
Seattle	896,139	1.7
New Orleans	552,140	1.0
Norfolk	527,363	1.0
Portland	337,965	.6
Tampa	133,375	.3
Charleston, S. C.	132,000	.2
Savannah	121,000	.2
Chicago	101,763	.2
Jacksonville	40,656	.1
Houston	22,156	.1
Tacoma	21,555	..
San Juan	4,965	..
Total	53,170,074	100.0

Ports of Entry of Belgian Whiting—All ocean shipments of Belgian whiting are made by way of Antwerp. Of the shipments to the United States during the first half of 1927, over 58% was entered by way of New York, 15% by way of Philadelphia, and 10% by way of Boston.

TABLE 12—BELGIAN WHITING: EXPORTS TO THE UNITED STATES DURING THE FIRST HALF OF 1927, BY PORTS OF ENTRY

Port of entry	Quantity, lb.	Pct. of total
New York	10,813,563	58.2
Philadelphia	2,860,645	15.4
Boston	1,810,770	9.7
Baltimore	984,574	5.3
New Orleans	793,656	4.3
San Francisco	380,183	2.0
Los Angeles	239,750	1.3
Savannah	165,345	.9
Seattle	132,276	.7
Norfolk	121,253	.7
Oakland, Portland, and Charleston, S. C.	269,953	1.5
Total	*18,571,968	100.0

*Exclusive of 1,226,860 lb. for which adequate data were not available.

Table 12 shows the exports of Belgian whiting to the United States during the first six months of 1927, by ports of entry.

Transportation and Other Charges to New York—Table 13 shows transportation charges by the leading ports of entry and the weighted average transportation cost of Belgian whiting shipped to the United States during the first six months of 1927. The data shown in Table 13 were compiled from consular invoices.

43,000,000 lb. of whiting imported in 1926, shows that New York consumes the largest quantity of imported whiting, namely, 43% or 18,792,231 lb. Boston ranks second with 14%, and Philadelphia third with 12%.

TABLE 15—DISTRIBUTION OF IMPORTED WHITING IN THE PRINCIPAL CONSUMING CENTERS IN THE UNITED STATES IN THE YEAR 1926

City or district	Quantity, lb.	Per cent of total
New York	18,792,231	43
Boston	6,264,077	14
Philadelphia	5,011,262	12
Chicago	3,132,039	7
Baltimore	1,252,815	3
Detroit	1,252,815	3
Atlantic ports south of Baltimore and Gulf ports	1,252,815	3
Pacific ports	6,264,077	15
Total	43,222,131	100

The principal ports of entry are also the principal centers of consumption for both the domestic and the imported whiting. No domestic whiting is shipped to the Pacific coast; there the requirements are supplied by the imports. The sales of domestic whiting in the southern states are relatively small and the imports of whiting by way of the southern ports constitute a small part of the total imports. Consequently the part of both the domestic and imported whiting that moves to interior points in the United States incurs practically the same transportation costs.

TABLE 13—WHITING: TRANSPORTATION AND OTHER CHARGES ON IMPORTS INTO THE UNITED STATES FROM BELGIUM DURING THE FIRST HALF OF 1927
(Per 100 lb.)

Port of entry	New York	Philadelphia	Boston	Other ports	Weighted average, all ports
Inland freight	$0.0297	$0.0264	$0.0209	$0.0313	$0.0286
Ocean freight	.1778	.1781	.1823	.2026	.1824
Insurance	.0022	.0021	.0021	.0024	.0021
Consular fees	.0018	.0021	.0025	.0039	.0023
Miscellaneous charges	.0112	.0095	.0086	.0128	.0110
Total	$0.2227	$0.2182	$0.2164	$0.2530	$0.2264
Quantity imported, lb.	10,813,563	2,860,644.87	1,810,770.26	3,086,991.15	*18,571,969.28

*1,226,859.90 lb. of whiting excluded from total, because adequate data were not available.

Consuming Centers

Detailed figures showing the consumption of domestic whiting cannot be published without revealing the individual operations of the domestic manufacturers. Information obtained from the sales records of all the domestic manufacturers producing whiting shows that of the total sales 14.3% was consumed at Boston, 9.3% at New York, and Philadelphia ranked third. Of the 1926 sales of domestic whiting, 52% was used in Massachusetts, New York, Pennsylvania and New Jersey, and 14% in Connecticut and Rhode Island. Close to 50% of the total sales was consumed in Boston, New York City, Philadelphia and neighboring places. Table 14 shows the sales distribution of domestic whiting in the calendar year 1926 by states.

TABLE 14—SALES DISTRIBUTION OF DOMESTIC WHITING BY STATES, DURING THE CALENDAR YEAR 1926

State	Sales in pounds	Pct. of total
Massachusetts	19,651,200	17.76
Pennsylvania	15,350,200	13.87
New York	11,662,000	10.54
Ohio	11,625,200	10.50
Michigan	11,559,000	10.44
New Jersey	11,342,200	10.25
Connecticut	9,470,200	8.55
Rhode Island	6,195,800	5.59
Illinois	4,978,800	4.50
Indiana	3,876,200	3.50
Maryland	1,224,200	1.11
Wisconsin, West Virginia, Minnesota	3,317,400	3.00
All other states	429,165	.39
Total	110,679,565	100.00

Table 15, giving the distribution of over 43,000,000 lb. of whiting imported in 1926, shows that New York consumes the largest quantity of imported whiting, namely, 43% or 18,792,231 lb. Boston ranks second with 14%, and Philadelphia third with 12%.

Comparison of Costs at Principal Markets

A comparison of the costs of production in the United States and Belgium at the principal markets, namely, New York, Boston and Philadelphia, shows that the maximum increase in duty of 50% of the duty provided for in paragraph 20 of Title I of the act of 1922 will not equalize the differences in costs between these two countries.

Where the maximum increase of 50% provided for in Title I does not equalize the differences in costs of production in the United States and the principal competing country, the statute requires the application of subdivision (b) of section 315, Title III. This provides that in the event that the maximum increase of 50%, as provided in subdivision (a), does not equalize the ascertained difference in costs of production, the ad valorem duty shall be based upon the American selling price as defined in subdivision (f) of section 402 of the act of 1922. Information obtained in this investigation indicates that a change in the basis of assessment of the 25% ad valorem duty from foreign market value to American selling price fails to equalize production costs in the United States and in the principal competing country.

Precipitated Chalk

Rates of Duty—Precipitated chalk has been dutiable under the last three general tariff acts as follows:

Act of 1922, paragraph 20: Chalk or whiting or paris white: Dry, ground, bolted, or precipitated, 25% ad valorem; * * *

Act of 1913, paragraph 15: Chalk, precipitated, suitable for medicinal and toilet purposes, 25% ad valorem; * * *

Act of 1909, paragraph 13: Chalk, when ground, bolted, precipitated naturally or artificially, or otherwise prepared; * * * 1c per lb. * * *

On February 18, 1927, the commission received an application for an investigation of whiting. This investigation, ordered May 26, 1927, was extended to include precipitated chalk. Representatives of the commission obtained cost data from each of the two domestic manufacturers of precipitated chalk, and checked all figures to the books of record. The field work was started in July, 1927, and was carried on in conjunction with field work on whiting. A field trip to obtain further information was also made in March, 1928.

In September, 1927, a representative of the commission obtained cost data from the principal producer of precipitated chalk in England, and checked the figures to the books of record of that firm.

Description and Uses

Precipitated chalk is a fine white powder, composed of microscopic crystals of calcium carbonate. It is odorless and tasteless, and nearly insoluble in water and is characterized by its high degree of fineness and the absence of gritty or other foreign matter. Its principal use is in the preparation of tooth pastes and powder. Other uses are (1) in the manufacture of cigaret and other tissue papers, (2) in the preparation of shaker salt, (3) as a neutralizing agent in fermentation processes, and (4) for medicinal purposes.

Precipitated chalk should not be confused with "by-product precipitated chalk" obtained in the course of chemical operations, principally from the preparation of caustic soda from soda ash and lime. By-product precipitated chalk, a product of inferior quality, is calcium carbonate containing a fraction of 1% alkali and is principally used as a filler in the manufacture of rubber goods.

The two raw materials used in the making of precipitated chalk are lime and carbon dioxide. Lime is obtained by calcining or burning limestone. It is produced on a large scale in the United States, the domestic output in 1925 being 4,510,000 tons, valued at $42,530,000. A specially selected grade is used in the preparation of precipitated chalk. Carbon dioxide is obtained as a by-product in "burning" lime. Another commercial source of carbon dioxide is the flue gas arising from coke-fired boilers.

Domestic Production and Consumption

Size of Industry and Location of Plants—The Lowell H. Palmer Chemical Works began to manufacture precipitated chalk in 1913 at York, Penn. The West Virginia Pulp and Paper Co. began production at Piedmont, W. Va. (postoffice at Luke, Md.), in 1921. As there are only two manufacturers, a statement of the domestic plant capacity is omitted from the public statement.

Method of Manufacture—Burnt limestone or quicklime (chemically known as calcium oxide) is slaked with water. The resulting calcium hydroxide is diluted and passed through fine screens or other devices to remove the undissolved and insoluble particles, and is then treated with carbon dioxide, which combines with the calcium hydroxide, giving an insoluble precipitate of calcium carbonate. The carbonation process is carried out under exact and carefully controlled conditions, either in open towers at atmospheric pressure or in closed vessels provided with agitators under superatmospheric pressure. The precipitate of calcium carbonate is filtered, and the filter cake is dried in hot-air tunnels. After disintegrating, the finished article is packed in paper-lined bags or barrels for shipment.

Production and Consumption—Official figures are not available on the domestic production of precipitated chalk. Production figures for 1926 gathered in the commission's investigation cannot be published without revealing the operations of the individual manufacturer. The annual consumption was estimated at 5,000,000 lb. in 1922 by C. H. Palmer, of the L. H. Palmer Chemical Works, in a statement before the Senate Finance Committee in that year.

Competitive or Substitute Products—There are no important substitutes for precipitated chalk in its principal uses.

England, France, Germany and Belgium manufacture precipitated chalk for export. Official production figures for these countries are not published. England is a larger producer than the United States.

Imports—Imports of precipitated chalk were not separately reported under the tariff act of 1909. Under the tariff act of 1913, imports of precipitated chalk "suitable for medicinal and toilet purposes" were reported by value for the period October 4, 1913, to December 31, 1918; the annual value of these imports ranged from a minimum of $26,312 in 1914 to a maximum of $41,793 in 1916. Imports of other precipitated chalk were included with ground chalk or whiting. Under the act of 1922, imports were first separately reported for 1927, when they amounted to 2,766,401 lb. Imports for the year 1926 were compiled by the commission from consular invoices and amounted to 3,132,527 lb.

Table 16 shows imports of precipitated chalk by countries of origin for the calendar years 1926 and 1927.

Principal Source of Imports—England is the principal source of imports of precipitated chalk. In the years 1926 and 1927 over 80% of the imported product originated in England.

Grades of Precipitated Chalk

The three leading grades of precipitated chalk recognized in the trade are extra light, light, and heavy. These grades differ principally in density. Domestic production and imports are largely of the "light" grade. The grade known as heavy is produced and imported in relatively small quantities. One domestic plant produces only the light precipitated chalk, and the other plant all three grades. The precipitated chalk used in pharmaceuticals, which constitutes a small part of the total consumption, is known as the USP, and must conform to the specifications of the United States Pharmacopoeia. The entire production of one of the domestic plants meets the USP requirements, and it is understood that most of the imported article is also of this quality.

The principal use of precipitated chalk is in the preparation of tooth pastes and powders. The tooth paste manufacturers use different grades of precipitated chalk. Individual manufacturers of tooth pastes have their own standards of quality. There are no exact and accepted standards and methods of testing in the dentifrice trade for precipitated chalk. The various tests used in the determination of quality include the density test, sedimentation test, wet bulk, alkalinity, fineness, flotation, and the capacity to give a dental paste of the desired consistency when used in a definite quantity.

Comparability of Domestic and Imported Product

The trade and consumers generally maintain that the imported English precipitated chalk is superior to most of the domestic product for the preparation of tooth pastes. One point of superiority of the imported article is its capacity to form a paste of a consistency that will not spread or flatten out when extruded from the tube. One of the domestic manufacturers is now producing precipitated chalk reported to be equal to that of the English product for use in dentifrices.

TABLE 16.—PRECIPITATED CHALK: IMPORTS BY COUNTRIES, 1926 AND 1927

Imported from—	1926 Quantity pounds	1926 Foreign value	1926 Unit value	1927 Quantity pounds	1927 Foreign value	1927 Unit value
England	2,611,847	$82,774	$0.032	[1]2,300,295	$72,375	$0.031
Germany	245,200	5,653	.023	57,991	1,487	.026
France	99,915	202	.002	195,274	4,954	.025
Belgium	122,337	248	.002	55,115	93	.002
Other countries	53,228	1,237	.023	157,726	3,729	.024
Total	3,132,527	$90,114	$0.029	2,766,401	$82,638	$0.030

[1] United Kingdom.

Prices

Chemical Markets publishes quotations on two grades of precipitated chalk, namely, the light and heavy; the *Oil, Paint and Drug Reporter* gives quotations on the extra light, light, and heavy grades. As previously stated, the principal grade consumed in the United States is the light precipitated chalk. Quotations in recent years on the light and extra light grades show a spread of less than 1% per pound.

Table 17 gives the wholesale, spot prices of light and extra light precipitated chalk in the New York market for 1913, and for the period 1922 to April, 1928, by quarters.

TABLE 17—PRECIPITATED CHALK: WHOLESALE SPOT PRICES IN NEW YORK MARKET, 1913 AND 1922-1928 (APRIL)*

(Cents per pound)

Year and month	Light	Extra light
1913—		
January	4 -4¼	Not quoted
April	4 -4½	Not quoted
July	4 -4½	Not quoted
October	4 -4½	Not quoted
1922—		
January	3 -3¾	3½-4¼
April	3 -3¾	3½-4¼
July	3 -3¾	3½-4¼
October	3 -3¾	3½-4¼
1923—		
January	3 -3¾	3½-4¼
April	3¾-4½	4¼-5
July	3¾-4½	4¼-5
October	3¾-4½	4¼-5
1924—		
January	3¾-4½	4¼-5
April	3¾-4½	4¼-5
July	3¾-4½	4¼-5
October	3¾-4½	4¼-5
1925—		
Janaary	3¾-4½	4¼-5
April	3¾-4½	4¼-5
July	3¾-4½	4¼-5
October	3¾-4½	4 -4¼
1926—		
January	3¾-4½	4 -4¼
April	4 -5¼	4¼-4¾
July	4 -5¼	4¼-4¾
October	4 -5¼	4¼-4¾
1927—		
January	4 -5¼	4¼-4¾
April	4 -5¼	4¼-4¾
July	4 -5¼	4¼-4¾
October	4 -5¼	4¼-4¾
1928—		
January	4 -5¼	4¼-4¾
April	4 -5¼	4¼-4¾
July		
October		

**Oil, Paint and Drug Reporter.*

The commission obtained actual receipts from the books of the two domestic manufacturers. The weighted average selling price of the total domestic sales is not far from the c.i.f. New York value of the English precipitated chalk. The selling price of the imported article was, however, considerably higher than that of the domestic product.

Costs of Production

Cost data were obtained from the two domestic producers of precipitated chalk in November, 1927, and from the other in March, 1928. Both sets of figures were checked to the books of record of companies furnishing them. For one firm the period covered was January 1 to September 30, 1926, and for the other, November 1, 1925, to October 31, 1926. The weighted average of the two companies for the indicated periods is used as the domestic cost of production for purposes of this investigation.

In September, 1927, the commission's representative in Europe obtained from the principal producer in England cost of pro-

duction data and checked the figures to the books of record of that producer. This firm exports most of the precipitated chalk from Great Britain, and makes most of the precipitated chalk imported into the United States. The cost data cover the calendar year 1926.

Table 18 shows the percentage that each item of cost is of the total unit cost of production in the United States and in England. The publication of actual costs for either the United States or for England would reveal the costs of individual manufacturers.

TABLE 18.—PRECIPITATED CHALK: DOMESTIC AND FOREIGN COSTS—PERCENTAGE DISTRIBUTION BY ITEM

Item	Percentage of total cost Domestic	Foreign
Raw material	13.22	12.71
Factory expenses—		
Labor, including superintendence	23.55	17.22
Repairs and maintenance	5.37	10.22
Power, including coke or coal	13.64	23.48
Containers	19.01	19.98
Other factory expenses	5.37	.94
Total factory expenses	66.94	71.84
General and administrative expenses—		
Officers' salaries	3.72	1.58
Office salaries and expenses	4.55	3.54
Depreciation	6.61	3.87
Insurance	1.24	.57
Other, including taxes	.41	1.25
Total general and administrative expense	16.53	10.81
Cost of production exclusive of imputed interest	96.69	95.36
Imputed interest	3.31	4.64
Cost of production including imputed interest	100.00	100.00

Methods of Marketing—The domestic manufacturers and the importers sell precipitated chalk direct to the consuming industries. Shipments to the principal consuming points are made in carload lots; to the smaller consuming centers, in less than carload lots. Practically all precipitated chalk that is imported into the United States from England is handled by one firm in New York. The domestic article is shipped in paper-lined barrels. Invoices of imported English precipitated chalk show that about 80% is shipped in calico-lined bags and the remainder in barrels. Aside from containers, there are no important differences in handling the domestic and the imported product.

Consuming Centers—Detailed information on the distribution of sales by quantity to each consuming point was obtained by the commission from the books of record of the two domestic manufacturers. Information on the distribution of imports of the principal importer handling nearly all of the imported English chalk was also obtained. The publication of the details of distribution of sales of the two domestic producers and of the imported English chalk would reveal the operations of individual firms. The data at hand show that New York is the principal consuming center for both the domestic and the imported article. A larger percentage of the total imports of precipitated chalk than of the total sales of the domestic product is sold in New York. The domestic article is more widely distributed than the imported.

TABLE 19.—PRECIPITATED CHALK: IMPORTS BY CUSTOM DISTRICTS, 1926 AND 1927

Custom district	1926 Quantity pounds	1926 Value	1926 Unit value	1926 Per cent of total quantity	1927 Quantity pounds	1927 Value	1927 Unit value	1927 Per cent of total quantity
New York	2,747,437	$83,869	$0.031	87.71	2,507,416	$75,604	$0.030	90.64
Boston	177,452	368	.002	5.67	.....	.....	.....	.....
Los Angeles	.....	.....	.....	.....	112,000	2,447	.022	4.05
Maryland	62,700	659	.011	2.00	22,400	693	.031	.81
San Francisco	51,406	1,966	.038	1.64	51,660	1,615	.031	1.87
New Orleans	45,360	1,675	.037	1.45	20,160	731	.036	.73
Philadelphia	24,560	809	.033	.78	40,439	1,280	.032	1.46
All other	23,612	768	.033	.75	12,326	268	.022	.44
Total	3,132,527	$90,114	$0.029	100.00	2,766,401	$82,638	$0.030	100.00

Ports of Entry—About 83% of the imports of precipitated chalk originates in England and is exported mainly from Bristol. In the years 1926 and 1927 nearly 90% of the imports were through the port of New York.

Table 19 shows imports of precipitated chalk by customs districts.

Transportation and Other Charges from England to New York—A study of transportation charges on English chalk was made from the invoices by the commission. Table 20 shows the transportation charges on 2,234,848 lb. of English precipitated chalk for the year 1926 from Birmingham, England, to New York.

TABLE 20—PRECIPITATED CHALK: TRANSPORTATION CHARGES FROM ENGLAND TO NEW YORK, 1926

(Cents per 100 lb.)

Inland freight	$0.194
Shipping charges to port	.012
Ocean freight	.398
Insurance	.016
Total	$0.620

Freight Rates on Precipitated Chalk from Domestic Plants to New York—Table 21 shows freight rates on precipitated chalk from domestic plants located at York, Penn., and Luke, Md., to New York, the principal port of entry, and the chief consuming center for both the domestic and imported product. The bulk of the domestic production is shipped in carload lots; smaller quantities in less than carload lots. Carload and less than carload lot rates are given for purposes of comparison.

TABLE 21—PRECIPITATED CHALK: ALL RAIL FREIGHT RATES FROM YORK, PENN., AND LUKE, MD., TO NEW YORK, PRINCIPAL CENTER OF CONSUMPTION

(Per 100 lb.)

From—	To—New York Car lots	Less than car lots
York, Penn.	$0.34	$0.44
Luke, Md.	.395	.565

Comparison of Domestic and Foreign Costs

Comparison of domestic and foreign costs of production, including imputed interest and transportation costs to New York, the principal consuming market, indicates that the minimum duty permissible under section 315, 12½% ad valorem, is more than sufficient to equalize the differences in costs of domestic and foreign precipitated chalk.

[The foregoing is the most comprehensive survey of the manufacture and uses of whiting the editors know of—we have often been asked for such details of the industry.—The Editors.]

South Carolina Granite Quarry to Make Crushed Stone

THE CAPITAL GRANITE CO., Robt. G. Lassiter, Oxford, N. C., president, is a new concern recently come to Newberry county, and will operate a large quarry at Blairs in the eastern part of the county.

Machinery of the most modern type is being installed that is electrically propelled and will crush 40 cars of rock per day, according to information from H. B. St. Lawrence, the manager.

Electric shovels for handling the crushed granite and large powerful electrically-driven crushers that crush large 5-ft. stones are also being installed at the plant at Blairs, which will be the largest in South Carolina.

Mr. St. Lawrence comes from New York and is an experienced man, having been with the Capital Granite Co. for the past 11 years.—*Newberry* (S. C.) *Herald and News.*

Wagner Quarries Co. to Expand Water Shipments

INSTALLATION of a new belt conveyor for the loading of stone at the new Wagner Quarries Co. dock, foot of Warren street, Sandusky, Ohio, has been started, it is stated, with the announcement that construction work on the dock proper has been completed.

The loader, which will have a capacity of 700 tons per hour, will be in operation about June 1, William J. Sprow, secretary and treasurer of the Wagner company, said. Previous announcement indicated the first of next month as the date on which shipping at the greatly increased capacity would be commenced.

According to Mr. Sprow, 1,000,000 tons of rock will be shipped from the local dock annually, and in contrast to the 1000-ton boats in present use, freighters of from 5000 tons up will be employed. To furnish the necessarily increased amount of stone, between 75 and 100 men, and possibly more, will be added to the quarries forces.

The dock, with its modern facilities for the speedy handling of stone products, is generally regarded as one of the most important additions to industrial Sandusky made in recent years—one which will contribute a large share to present waterfront activity, in addition to swelling the scope and value of products shipped from the port. —*Sandusky* (Ohio) *News.*

Cement Association Holds Unique Ceremony at New York Meeting

Formal Award of Safety Trophies Impressive

ON WEDNESDAY, May 23, near the conclusion of the business session of the Portland Cement Association's spring meeting, other matters of urgent importance to the industry were laid aside for approximately an hour in order to make formal award of the association's safety trophies for 1927.

Earlier in the session the board of directors in its report to the membership had declared:

"The board takes unusual pleasure in the achievement of the ten mill organizations to receive this reward.

"The magnificent example of these plants accounts largely for the fact that 66 operating plants finished the first quarter of 1928 without accident.

"These results demonstrated to us that the trophy award has been a wise investment."

As President G. S. Brown of the association is president of the Alpha Portland Cement Co., two of whose mills are among the winners, Mr. Brown found himself among the happy recipients on this occasion, and the place of presentor, usually occupied by the president of the association, was taken by David M. Kirk, president of the Crescent Portland Cement Co. Formal award of the trophy was made by him to the following mills:

Alpha Portland Cement Co., Ironton, Ohio.
Alpha Portland Cement Co., Plant No. 3, Martins Creek, Penn.
Canada Cement Co., Ltd., Belleville, Ont.
Canada Cement Co., Ltd., Hull, Que.
Cowell Portland Cement Co., Cowell, Calif.
Kansas Portland Cement Co., Bonner Springs, Kan.
Lehigh Portland Cement Co., Iola, Kan.
Lehigh Portland Cement Co., Plant No. 3, Newcastle, Penn.
San Antonio Portland Cement Co., San Antonio, Texas.
Universal Portland Cement Co., Duluth, Minn.

The above mills were represented by the following delegates:

Ironton (Ohio) mill—W. W. Hamilton, plant engineer, who has been in the employ of the Alpha company since June 1, 1920, and W. L. Patterson, mine foreman, in the employ of Alpha since August 1, 1908. Mr. Patterson, in charge of a limestone mine 650 ft. below the surface, brought his force of 75 men through with hardly a scratch.

Martin's Creek mill—Moses A. Evert, machinist foreman, who cannot remember the last accident in the machine shop, several years ago. Mr. Evert was employed in 1907. Raymond Seas, foreman of power department, who has been with the Alpha organization since October 12, 1908.

Winners of Portland Cement Association Trophies for 1927

ALPHA PORTLAND CEMENT CO.,
Ironton (Ohio) plant.
F. C. Brownstead, superintendent.
Delegates: W. W. Hamilton, W. L. Patterson.

ALPHA PORTLAND CEMENT CO.,
Martin's Creek (Penn.) Plant No. 3.
John L. White, superintendent.
Delegates: Moses A. Evert, Raymond A. Seas.

CANADA CEMENT CO., LTD.,
Belleville (Ont.) plant.
J. H. Legate, superintendent.
Delegates: W. J. Armstrong, Fred Whitehead.

CANADA CEMENT CO., LTD.,
Hull (Que.) plant.
Elmer French, superintendent.
Delegates: F. W. Coleman, Napoleon Porrier.

COWELL PORTLAND CEMENT CO.,
Cowell (Calif.) plant.
E. D. Barnett, superintendent.
Delegates: H. G. Brann, Tony Avila.

KANSAS PORTLAND CEMENT CO.,
Bonner Springs (Kan.) plant.
L. J. Wheeler, superintendent.
Delegates: George Davenport, John Ditto.

LEHIGH PORTLAND CEMENT CO.,
Iola (Kan.) plant.
C. A. Swiggett, superintendent.
Delegates: R. E. McDonald, R. D. Moritz.

LEHIGH PORTLAND CEMENT CO.,
New Castle (Penn.) No. 3 plant.
W. H. Kleckner, superintendent.
Delegates: J. H. McFall, Charles Schlicher.

SAN ANTONIO PORTLAND CEMENT CO., San Antonio (Tex.) plant.
H. O. Rinehold, superintendent.
Delegates: H. O. Rinehold, superintendent; S. F. Barrera, timekeeper.

UNIVERSAL PORTLAND CEMENT CO.,
Duluth (Minn.) plant.
Ray S. Huey, superintendent.
Delegates: H. M. Eyer, A. E. Miller.

The P. C. A. trophy of the San Antonio Cement Co.

Belleville (Ont.) mill—W. J. Armstrong, chief clerk, who was employed in 1915, and Fred Whitehead, pattern maker, who went with the Canada company in 1916.

Hull (Que.) mill—F. W. Coleman, machine shop foreman (in service since 1916), and Napoleon Poirier, who speaks French, represented the French-speaking workers of the Hull mill.

Cowell (Calif.) mill—H. G. Brann, night mill foreman, employed since 1921, and Tony Avila, machinist, employed since 1924.

Bonner Springs (Kan.) mill—George Davenport, electric shovel operator, who entered the service of the Kansas company January 3, 1923, and John Ditto, general mill foreman, with the company since January 25, 1923.

Iola (Kan.) mill—R. E. McDonald, chief engineer, who went with the Iola plant in 1907, and R. D. Moritz, master mechanic, employed there since 1904.

New Castle (Penn.) mill—J. H. McFall, chemist, who went to work there in March, 1914, and Charles Schlicher, chief clerk, employed since May, 1901.

San Antonio (Texas) mill—H. O. Rinehold, superintendent, and S. F. Barrera, timekeeper.

Duluth (Minn.) mill—H. M. Eyer, chief electrician, who was employed by the Universal company and has never had an accident in the electrical department since the mill started operation February 25, 1916; A. E. Miller, general foreman of packing, loading and sacks, who has been with the company since 1908.

In formally presenting the trophies, Mr. Kirk emphasized the tremendous progress being made in safety work in the cement industry during the last few years, attributing it largely to the better understanding between employer and employe. Mr. Kirk saw this as evident everywhere in the interest employers are now taking in the welfare of their men. He congratulated the delegates as ambassadors of industrial good will, and explained that as the actual trophies weighed 16,000 lb. and were much too large for watch charms, he was presenting each delegate with a large platinum print of the trophy as a souvenir of the occasion.

Appropriate speeches of acceptance were made by the following, on behalf of the entire delegation: W. W. Hamilton, W. J. Armstrong, H. G. Brann, R. D. Moritz and George Davenport. More than 200 leading

Safety committee of the Canada Cement Co., Ltd., Plant No. 5, Belleville, Ont.

Safety committee of the Alpha Portland Cement Co., Martins Creek, Penn.

Safety committee of Lehigh Portland Cement Co., Plant No. 3 New Castle, Penn.

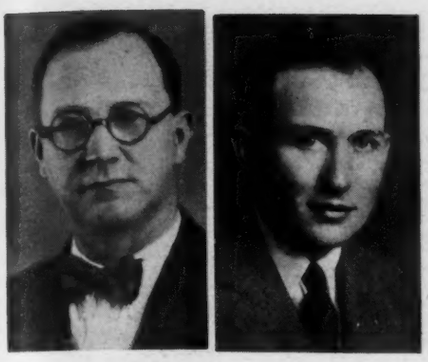
Safety committee of the Kansas Portland Cement Co., Bonner Springs, Kan., a subsidiary of the International

Safety committee of the San Antonio Portland Cement Co. San Antonio, Texas

Safety committee of the Canada Cement Co., Ltd., Plant No. 3, Hull, Que.

Safety committee of the Alpha Portland Cement Co., Ironton, Ohio, plant

Safety committee of the Lehigh Portland Cement Co., Iola, Kan., plant



W. L. Patterson *W. W. Hamilton*
Ironton Plant, Alpha P. C.

executives and operating heads of the cement industry witnessed the ceremony.

Busy Week

The mill representatives reached New York on Sunday, May 20, and proceeded to put in a busy week. On Monday evening they were the guests at a dinner party at the Engineers Club of J. B. John, chairman of the Committee on accident prevention of the Portland Cement Association; A. C. Tagge, president of the Canada Cement Co. and former chairman of the committee, and A. J. R. Curtis, committee secretary. After the dinner a general discussion on safety work was held, lasting until after 11 o'clock.

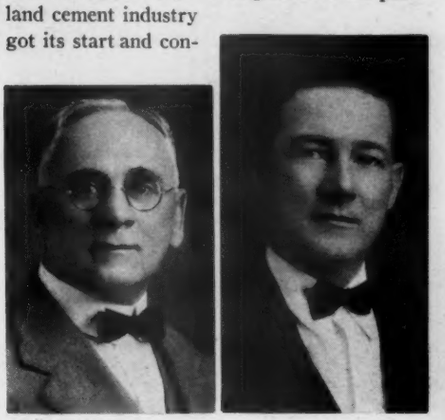
The delegates were also guests at luncheons on Tuesday and Wednesday and at dinner on Wednesday. Several of them visited local cement mills, and 14 of their number participated in the regional safety meeting of the Portland Cement Association at Easton, Penn., on Friday, May 25. The presence of this large group at the meeting helped representatives of the Lehigh Valley mills to visualize as never before the progress being made by the association's trophy contest.

F. W. Coleman *N. Poirier*
Hull Plant, Canada Cement, Ltd.

George Davenport and John Ditto, delegates from the mills of the Kansas Portland Cement Co., spent May 25 at the plant of the Knickerbocker Portland Cement Co. at Hudson, N. Y., participating in a general safety rally held by the Knickerbocker mill organization in preparation for the June no-accident campaign.

Lehigh Valley Cement Mills Hold Annual Safety Conference

DOWN in the Lehigh Valley, where the regional safety meeting idea of the portland cement industry got its start and continues to flourish, a group of 200 assembled for the annual safety pow-wow on Friday, May 25. Hotel Easton, at Easton, Penn., was crowded for the occasion. R. B. Fortuin, assistant to the general manager of the Pennsylvania-Dixie Cement Corp. at Nazareth, acted as local chairman and was assisted by Russell Frame of the Alpha Portland Cement Co. of Easton and David Adam of the Lawrence Portland Cement Co. of Northampton, Penn. The main program features were as follows:



M. A. Evert *Ray Seas*
Martins Creek Plant, Alpha P. C.

H. G. Brann *Tony S. Avila*
Cowell Portland Cement Co.

What Made 1927 the Banner Year in Our Accident History—A. J. R. Curtis, assistant to general manager, Portland Cement Association.

Introduction of visiting representatives of plants which won 1927 Association Safety Trophy.

How the Ironton Plant Won Their Trophy —W. W. Hamilton, plant engineer, Alpha Portland Cement Co., Ironton, Ohio.

Hazards of Electricity and How You Can Handle It with Safety—Fred B. Hunt, electrical engineer, Nazareth Portland Cement Co.

Duty of Foreman and Workmen to Cooperate with the Management to Encourage Safety—William P. Gano, assistant manager, Pennsylvania-Dixie Cement Corp.

Explosives, Dangerous But Safe—W. A. Turnback, Hercules Powder Co.

Everybody's Experience

The following participated:

Thomas Avnsoe, general superintendent, International Cement Corp., New York.

Roy F. Weston, general superintendent, Allentown and Valley Forge Portland Cement Co., Allentown, Penn.

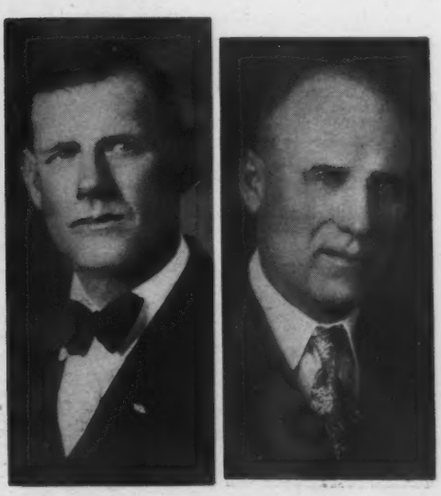
J. L. White, superintendent, Alpha Portland Cement Co., Martins Creek, Penn.

W. J. Armstrong *Fred Whitehead*
Belleville Plant, Canada Cement

Edward Parry, safety director, Glens Falls Portland Cement Co., Glens Falls, N. Y.

Charles P. Benner, district safety inspector, Lehigh Portland Cement Co., Allentown, Penn.

J. R. Cline, assistant superintendent, Universal Portland Cement Co., Universal, Penn.



Geo. Davenport *John Ditto*
Kansas Portland Cement Co.

R. E. McDonald *R. D. Moritz*
Lehigh Portland

H. H. Leh, superintendent, Lone Star Cement Co., Nazareth, Penn.
Alexander Morrow, quarry superintendent, Atlas Portland Cement Co., Northampton, Penn.
W. E. Gehrie, safety engineer, Atlas Portland Cement Co., Northampton, Penn.
Moses A. Evert, foreman, Alpha Portland Cement Co., Martins Creek, Penn.
W. J. Armstrong, Canada Cement Co., Belleville, Ont.
Juia A. Weder, industrial nurse, Giant Portland Cement Co., Egypt, Penn.
M. K. Lichty, auditor, Lawrence Portland Cement Co., Northampton, Penn.
David Adam, safety engineer, Lawrence Portland Cement Co., Northampton, Penn.
G. B. Searlis, engineer, Nazareth Portland Cement Co., Nazareth, Penn.
K. P. Abel, safety engineer, Penn.-Dixie Cement Corp. Plant No. 4.
H. G. Kramer, safety engineer, Penn.-Dixie Cement Corp. Plant No. 5.
Charles T. Roth, safety engineer, Penn-Dixie Cement Corp. Plant No. 6.

Safety Dinner—About 250 delegates attended the annual safety dinner of the Lehigh Valley mills in the large banquet hall of Hotel Easton that evening. Joseph Brobston, vice-president of the Nazareth Cement Co., one of the early members of the committee on accident prevention of the Portland Cement Association, presided as toastmaster. Professor J. B. Hopkins of Lafayette College, at Easton, was the speaker of the evening. The plant orchestra of the Nazareth Portland Cement Co. furnished excellent music during dinner. William P. Gano, assistant manager of the Pennsylvania Dixie Cement Corp., sang a delightful solo and led the group singing.

William P. Gano
Penn.-Dixie

Throughout the entire meeting the need for intense organization was stressed if the mills of the Lehigh Valley group may expect to attain a perfect record during the June campaign. It was the opinion of some of the speakers that they would have to work very hard to equal last year's record of six lost time accidents in the mills of the valley during the month. Every man present pledged himself to do everything in his power to bring his mill through June safely and to carry back to his organization a determination to work as long and as hard as necessary to put the campaign across in a manner worthy of the valley.

J. A. McFall *Charles Schlicher*
New Castle Plant, Lehigh P. C.

S. F. Barrera *H. O. Rinehold*
San Antonio Portland

Indiana and Surrounding Cement Mills Hold Safety Meeting

THE SEVEN CEMENT MILL organizations of Indiana, the Kosmos plant at Kosmosdale, Ky., and the Osborn (Ohio) plant of the Southwestern Portland Cement Co. joined in a regional safety meeting under the auspices of the Portland Cement Association at Indianapolis, Ind., on Tuesday, June 5.

All of the sessions held in the Indianapolis Athletic Club were enthusiastic and packed to the capacity of the room. D. S. MacBride, vice-president of the Indiana Portland Cement Co., called the meeting to order as chairman of the local committee and welcomed plant representatives. J. J. Oakes, superintendent of the Indiana company's plant at Greencastle, told of the interest displayed throughout his organization. Miss Mabel Jordan, safety director at Greencastle, read an interesting paper on the safety campaign which reduced accidents there by 50% in one year.

Russell Frame
Alpha Portland

W. H. Weitknecht, superintendent of the Lehigh Portland Cement Co.'s plant at Mitchell, presided at the afternoon session and brought with him a group of his competent assistants, many of whom participated in the discussions. Although it was impossible for A. C. Brown, vice-president and works manager of the Kosmos Portland Cement Co., to be present because of an emergency, Mr. Brown sent a delegation of 25 men from the Kosmos mill by bus, under the leadership of G. L. Kirp, chemical engineer. Mr. Kirp described safety work at the mill and was able to point to a remarkable record of progress.

The Louisville Cement Co. chartered a sleeper and sent a rousing delegation under works manager H. D. Baylor, personnel director A. E. Snodgrass and assistant safety director C. L. Baylor. The delegation included the prize first-aid team of the Louisville company and the company's "safety first" quartet. The first-aid team presented a demonstration of safety work under the direction of C. L. Baylor. The latter also read a paper describing safety organization methods in use by the Louisville company. President Speed of that company sent best wishes and regretted his inability to be present.

O. R. Cornelius, paymaster of the Southwestern Portland Cement Co.'s plant at Os-

H. M. Eyer *A. E. Miller*
Duluth Plant, Universal

born, headed a delegation of several men from that organization. Mr. Cornelius, who represented W. T. Groner, superintendent, described the strenuous safety efforts being made by the Osborn organization and the surprising improvement from a poor record to one which promises this year to be among the best. Mr. Cornelius described the company's new bonus system by which every workman receives a 1% addition to his salary at the end of the month which is completed free from accident. President Powell and vice-president Merrill are giving every help, according to the speaker, and rapid progress is therefore anticipated as a matter of course.

The Universal Portland Cement Co.'s mills at Buffington were represented by a group of leading operating men led by J. H. Kempster, general superintendent; F. H. Sass, employment manager; E. H. Noble, general foreman. Messrs. Kempster, Sass and Noble all made inspiring addresses and told of the great safety drive at Buffington since January 1, since which time over 1,600,000 man-hours of work have been done without a single lost time accident. The enthusiasm of president Affleck, assistant to president Wilby and operating manager John Ahnfelt was mentioned as a primary factor in maintaining the interest of the 1600 workmen employed at Buffington. Unusual interest was displayed by those present in the struggle of the big mill to continue without accidents throughout the year.

Other speakers were A. U. Miller, assistant mining engineer, U. S. Bureau of Mines, Vincennes, and A. J. R. Curtis, assistant to general manager of the Portland Cement Association, Chicago. J. H. Kempster, general superintendent of the Universal Portland Cement Co., acted as toastmaster of the safety rally and dinner in the evening, at which Judge William A. Hough, chairman of the Indiana Tax Commission, entertained the delegates splendidly with episodes from the life of James Whitcomb Riley and recitation of a number of Mr. Riley's poems. Music was furnished by the Safety First Quartet of the Louisville Cement Co.

The registration was as follows:

Indiana Portland Cement Co., Greencastle, Ind.
Lea Dodge, assistant chemist.
Peter Hanson, mill foreman.
Mabel Jordan, secretary safety committee.
Henry L. Koessler, quarry foreman.
D. S. MacBride, vice-president.
John J. Oakes, superintendent.

Kosmos Portland Cement Co., Kosmosdale, Ky.
A. O. Ammons, shop foreman.
Harry Anderson, electrician foreman.
Ambrose Celletti, foreman.
H. A. Downs, construction department.
R. L. Ferguson, chief chemist.
H. M. Graybill, chief engineer.
James M. Hedden, shift foreman.
John H. Hendrick, foreman.
B. F. Hoffman, repair foreman.
J. M. Hopewell, foreman machine shop.
George L. Kirp, chemical engineer.
Tom Musselman, shift foreman.
J. O. Rahn, riner superintendent.
F. O. Ritchie, shipping clerk.
G. W. Ritchie, foreman finishing department.
G. M. Rodger, yard foreman.
C. A. Russell, inspector.
Allen E. Sauer, general representative.
Maywood Schafer, raw grinding foreman.
J. H. Smith, kiln-house foreman.
W. Armour Smith, cost accountant.
F. G. Tiedeman, purchasing agent.
Charles W. Troutman, quarry superintendent.
James Underwood, Sr., river foreman.
J. A. Wardrip, track department.

Lehigh Portland Cement Co., Mitchell, Ind.
Walter Batchelor, repair man.
Dr. J. D. Byrns, company surgeon.
Bert Callier, boiler-room foreman.
Bud Carman.
Carl E. Chastain, mechanic.
George F. Cooper, quarry foreman.
Benjamin M. Hughes, repair man.
N. G. Mather, packing-house foreman.
A. N. Palmer, chief clerk.
John Pilman, quarry foreman.
H. H. Purkhiser, assistant superintendent.
J. B. Sims, general foreman.
Otto Stewart, machinist.
Walter Stroud, shop foreman.
Noble T. Trueblood, shovel engineer.
William F. Wiedner, quarry foreman.
W. M. Weitknecht, superintendent.

Louisvi'le Cement Co., Speed, Ind.
H. D. Baylor, works manager.
Claude L. Baylor, safety engineer.
George W. Briner, foreman bag department.
Paul Cleveland, bag house.

D. S. MacBride

Jesse G. Dorsey, recreation director.
Fred Enders, powder foreman.
James Hunebaugh, foreman.
Jesse Hunebaugh sheet-metal foreman.
George M. Johnson foreman.
Elmer La Masters sheet-metal worker
John Regan, repair foreman.
Russell Smith, bag house.
A. E. Snodgrass personnel dept.
Todd Wathen, machinist.
Charles Weibel, steamfitter.

Southwestern Portland Cement Co., Osborn, Ohio
Cecil Bell.
O. R. Cornelius, paymaster.
Harry D. Meredith chief electrician.
R. L. Stewart, chemist.

Universal Portland Cement Co., Buffington, Ind.
O. C. Anderson, assistant superintendent.
Thos. Cadman, assistant chief power department
E. A. Christensen, superintendent P. L. and Sacks.
C. R. Decker, electrical foreman.
J. B. Harris, general mechanical foreman.
J. H. Kempster, general superintendent.
John P. Kent, civil engineer.
Louis Lohre, operating foreman.
E. H. Noble, general foreman.
F. H. Sass, superintendent safety and labor.
Louis H. Wagner.

Others Present
A. J. R. Curtis, Portland Cement Association.
L. C. Miller, Portland Cement Association.
A. U. Miller, assistant mining engineer, U. S. Bureau of Mines, Vincennes, Ind.
W. T. White, technical representative explosives department, E. I. Du Pont de Nemours and Co., Chicago, Ill.

Pittsburgh Regional Safety Meeting Postponed

THE REGIONAL SAFETY meeting of the Portland Cement Association, which was recently announced in ROCK PRODUCTS for Pittsburgh on Tuesday, June 19, has been postponed until a later date. It is hoped that a definite announcement of the date now being selected can be made in ROCK PRODUCTS for June 23.

President Signs Bill for Federal Aid in Building Highways

PRESIDENT COOLIDGE, on May 26, signed the Phipps bill (S. 2327) authorizing the appropriation of $165,000,000 for federal aid in state construction of highways and forest roads and trails for years 1930 and 1931.

The law authorizes appropriations of $75,000,000 for post roads during the fiscal year ending June 30, 1930, and $75,000,000 for use during the fiscal year ending June 30, 1931. An additional $7,500,000 is authorized for forest roads and trails in 1930 and the same amount in 1931.

L. A. Beeghly Chairman of the Board of Peerless-Egyptian Cement Company

DIRECTORS of the new consolidation of the Peerless Portland Cement Co., Detroit, Mich., and the New Egyptian Portland Cement Co., Port Huron, Mich., now known as the Peerless Egyptian Cement Co., are: R. D. Baker, Birmingham, Mich.; L. A. Beeghly, Youngstown, Ohio; William M. Hatch, Detroit; A. J. Henning, Chicago, Ill.; S. R. Livingston, Detroit; R. T. McKenna, Washington, D. C.; E. A. Peck, Chicago, Ill.; Charles Schmutz, Youngstown, Ohio; and C. C. Peck, Port Huron, Mich., formerly chairman of the board of the New Egyptian company.

At the first meeting of the newly elected board of directors the following officers were elected: L. A. Beeghly, chairman of the board; William M. Hatch, president; Charles Schmutz, vice-president; S. R. Livingstone, secretary; Calvin Baker, treasurer.

Mr. Beeghly is president of the Bessemer Limestone and Cement Co., and of the Federal Portland Cement Co., as well as of the Standard Slag Co.

The 1929 Road Congress to Be Held in Cleveland

THE NEXT exposition and convention of the American Road Builders' Association, it has been announced by President R. Keith Compton, will be held in Cleveland, Ohio, January 14-18, 1929.

There will be 450 carloads of road building and maintenance machinery on exhibition, including every type of equipment used in the construction and maintenance of all types of streets and highways. Over 30,000 road builders will be in attendance from all the states, counties and cities throughout the country, as well as large delegations from all Pan-American countries.

The convention and road show of the American Road Builders' Association is the largest convention of its kind in the entire world, equally important to the road constructor and to the road user. In addition to the general sessions of the convention, special sessions will be held by the various divisions of the association, and special days will be dedicated to the county highway officials' division, the city officials' division, the highway contractors' division, and the Pan-American division.

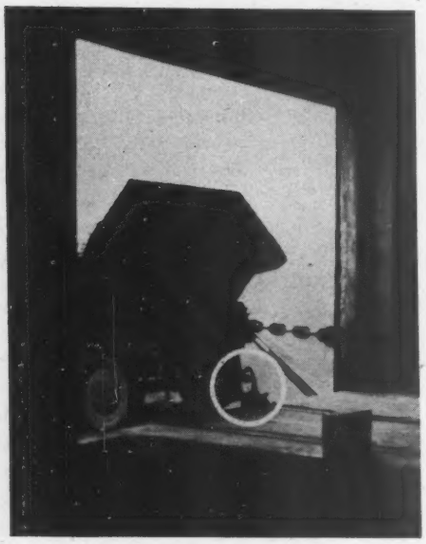
Hints and Helps for Superintendents

Returning Quarry Car to Incline

AT the plant of the Lawrence Portland Cement Co., Thomaston, Me., is an unusual and very satisfactory method of pulling a quarry car back on the quarry incline.

The car is brought up the incline by a hoist which pulls it on to a floor above the primary crusher. After the car is dumped two counterweights pull the car back and it is the method of attaching and detaching these counterweights that is of interest.

The counterweights are attached to a



Hook on car engaging the upper loop on the counterweight

cable that runs over a sheave and then to a double loop of steel. The man in the picture is pointing to one of these double loops. It is normally held in place by two short hooks catching in the lower loop as shown.

When the car reaches the top of the incline it picks up the loops by two hooks fastened to the car body. One hook just entering the loop is shown in the white circle in one of the photographs. As the car runs out on the floor it drags the loops with it and so pulls up the counterweight.

After the car is dumped the brakes of the hoist are released. The counterweights then draw the car back to the incline and as the car goes over the incline the loops catch on the double hooks and unhook themselves from the car.

The car is a heavy one holding 6 yd. and the hoist is of the remote control type with a 250-hp. motor that brings the cars up at a lively gait. But the hooking and unlooking of the counterweight loops is smooth and certain and the arrangement requires no attention from the hoist man.

Cantilever Testing Apparatus for Mortar Beams

THE Division of Tests of the Bureau of Public Roads has recently designed an apparatus for testing cement mortar beams under cantilever loading which furnishes a more rapid method of testing such beams and can be used in laboratories not equipped with a universal testing machine of sufficient sensitivity to do the testing otherwise. This apparatus consists of a clamping device to hold the beam securely and an extension arm which fastens to the end of the beam and transmits the load as shown in Fig. 1. The beam may be loaded by any means at hand, the figure showing the use of lead shot for this purpose.

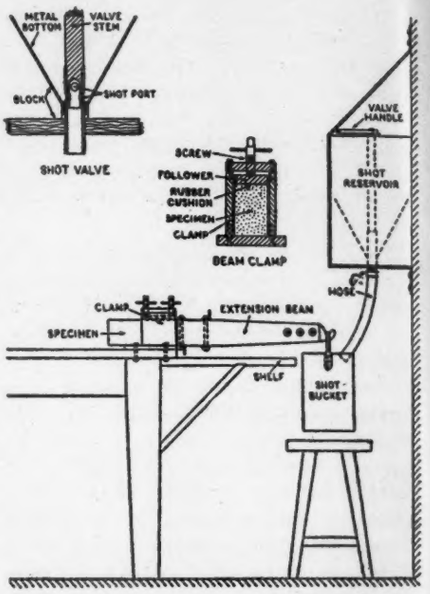
The two thumbscrews shown in the clamping device bear on a steel plate ⅜-in. thick which rests on the specimen. The specimen is tested in the same position in which it is molded; that is, with the troweled surface up. Since slight irregularities in the troweled surface prevent an even distribution of stress and tend to create a wide variation in test results, it was found necessary to place a piece of sheet rubber ⅛ in. thick between the specimen and the bearing plate. The test specimen should be made in steel molds, and be 2x3x12 in. in size.

Computations of the modulus of rupture are made using the formula

$$S = \frac{Mc}{I}.$$

where

S = modulus of rupture, in pounds per square inch,



Appapratus for testing mortar beams

M = bending moment in inch-pounds, = $W_1l_1 + W_2l_2$

where

W_1 = test load, in pounds,

l_1 = distance of load from support = 18.12 inches,

W_2 = weight of arm,

l_2 = distance of center of gravity of arm from support,

c = distance of extreme fiber from neutral axis, or 1½ inches,

I = moment of inertia of cross section of beam about its central horizontal axis.

In these computations the weight of the overhanging section of the beam is neglected

Two double loops attached to counterweights are picked up by quarry cars at the top of the incline, and draw the car back to the incline after dumping

in accordance with the usual practice in testing beams for flexure under center load.

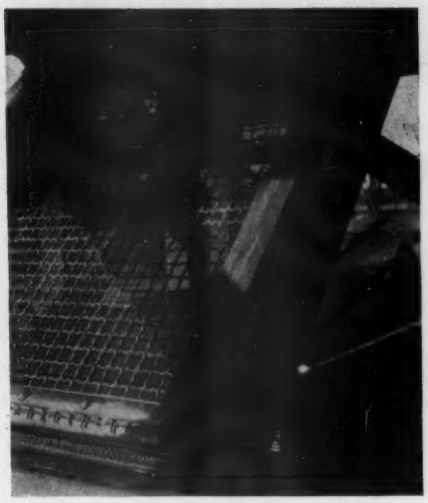
The Division of Tests has made several series of comparative tests of beams using this apparatus to demonstrate its suitability. There appears to be little variation between the test results obtained by this method and by the use of the usual universal machine. The strengths obtained are essentially the same and the variation found between individual breaks averages the same in each case. It may be said that the testing of mortar beams can be performed as accurately with this cantilever device as by the customary method in the universal machine.—*D. O. Wolf, in Public Roads.*

Repairing a Water Tank on a Locomotive Crane

W. L. HOME
Mining Engineer, Pine Plains, N. Y.

UPON starting up an old locomotive crane which was about 30 years old it was found that the water tank leaked so badly that it would not hold water. Patching jobs could not be resorted to because the iron was so old and thin that they only made it worse.

Being unable to find a suitable tank locally and not wanting to wait until a new one could be made, this one had to be fixed quickly. The tank was drained, cleaned and allowed to dry. A quantity of hard roofing pitch was put in a kettle and heated until it was sufficiently fluid to apply with a paint brush. The entire inside surface of the tank was then painted with a heavy coat of pitch. While the pitch was still hot heavy canvas strips were laid on this painted surface and pressed smoothly into place, both on the sides and bottom. After cooling off, this canvas covering was then given a good generous dose of pitch and in the same way another ply of canvas was applied. This canvas was in turn given two more coats of pitch and the job called finished.



Screen and sand drag at moveable sand plant

Moveable Plant Helps on Special Orders

MOVEABLE PLANTS for washing sand and gravel are of little use to the large producer of washed sand and gravel, but there are special cases where a moveable plant installation is justified and may result in a considerable saving of money. The plant illustrated here did this, supplying a sufficient quantity of material at low cost, well washed and graded, and without waste.

The situation which justified the building and use of a moveable plant was as follows: The Fort Worth Sand and Gravel Co., of Fort Worth, Texas, had a large order to fill which called for sand and gravel from 1¼-in. to 1-in. In its regular procedure it would have dug the bank material, shipped it over one road to its washing plant and from the plant it would have shipped it over another road to the plant. It so happened that it had ground near the second road, and by putting a moveable plant on this ground it was enabled to ship directly to the job, cutting out the cost of transporting to its regular washing and screening plant and the extra freight on a two-line haul. The saving more than paid the cost of the additional equipment; in fact, it gave a very fair profit, after including cost of equipment in working costs.

As an experiment a small moveable plant was built with a gravity screen and simple sand-saving appliances. This worked all right, but to gain greater capacity a larger plant and better equipment were needed. So a second plant was built, and this is shown in the photographs under construction.

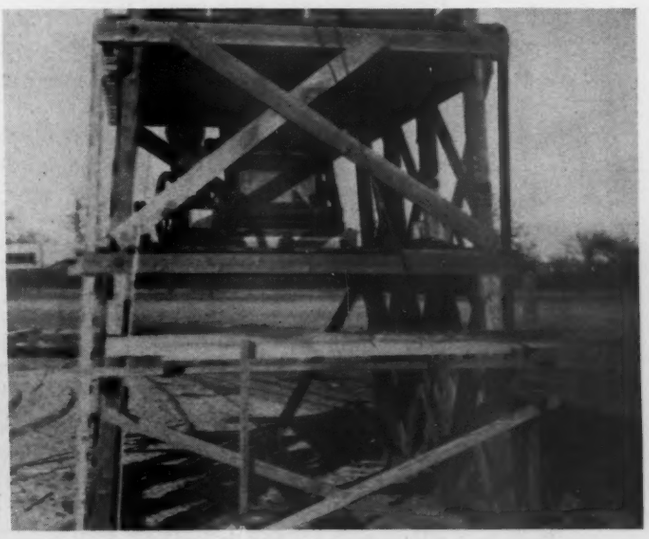
The plant has a hopper to receive the material dug by a small dragline excavator. Below this is a platform on which is a Deister double-deck vibrating screen. The upper deck takes out the oversize and the lower removes the sand and the intermediate size is the 1-in. gravel required. This is dry and falls down a chute into a railroad car below. The sand goes to a simple sand box with a chain and flight conveyor that draws out the settled sand and puts it in a chute through which it flows to another car. The water overflowing from the sand box runs into a waste chute and helps to carry the oversize away from the plant. When the ground is worked in the regular course of operations this oversize can be recovered.

The dragline used is a Pawling and Harnischfeger machine with a 40-ft. boom and a ¾-yd. bucket which can easily dig the eight to ten cars required daily.

When the plant is to be moved a car is run under it and the plant is jacked up on timbers placed in the car so that the sills of the plant clear the ground. The car is then pulled to the new position and the jacks let down so that the sills rest on the ground and the plant is again ready for business.

Power for the screen and sand drag is supplied by a "Monitor" gasoline engine. Another gasoline engine and a pump supply water which is taken from the excavation.

The original experimental plant at the front with the new moveable plant behind



The new moveable plant showing the screen in position and the railroad passing through underneath

Foreign Abstracts and Patent Review

Change in the Definition of Slag Cement. As a result of negotiations of professional societies of the German cement industry, the Minister of Transportation has ratified the following change in the German specifications for uniform manufacture and testing of slag cement, section I, definition of slag cement:

"Slag cement is a hydraulic cement containing 15 to 69% by weight of portland cement and consisting of basic blast furnace slag, granulated by rapid cooling of the molten mass. Slag and portland cement are pulverized and intimately mixed.

"Only slags from blast furnaces in steel plants having the following composition shall be used for the manufacture of slag cements:

$$\frac{CaO + MgO + \frac{1}{3}Al_2O_3}{SiO_2 + \frac{2}{3}Al_2O_3} > 1$$

"The slag shall not contain more than 5% MgO. The portland cement added shall conform to the definition given in the standards for portland cement. Special admixtures, for the purpose of regulating the time of set, shall not exceed 3% of the total weight, which excludes the possibility of admixtures to increase the weight of cement. The slag cement manufactured by companies belonging to the Association of German Slag Cement Manufacturers is under strict control of the association, whose members are pledged to manufacture slag cement in accordance with the definition given above."—*Tonindustrie-Zeitung* (1928), 681.

Use of Cinders, Coal and Coke Breeze in Concrete. Dr. R. F. Stradling, speaking at the British Building Trades exhibition, discussed the use of cinders, coal and coke breeze, the fines from coke ovens, as concrete aggregates. Failures of concrete containing these substances have not come from the sulphur content, as was formerly supposed, or at least such reason for failure is of rare occurrence. The source of failure may be traced to the physical characteristics of certain kinds of coal. Such coals may be identified by the high sorptive power for water and for colored dyes they possess, and also for their high sorptive power for oxygen. There is a whole series of coals from those which cause failure when present in a small percentage up to those which cause no failure when they are present to the amount of 50%. The "dangerous" classes of coal are only dangerous if present in an unburned or slightly oxidized condition. Then they produce an expansion in a setting and maturing concrete, which, if sufficient coal is present, leads to ultimate cracking.—*Contract Journal* (London), May 2.

Microscopic Study of the Hydration of Rapid Hardening Cements. Tests were conducted by K. Kumagae and T. Yoshioka. They studied, microscopically, the process of hydration of commercial aluminous cements and supercements of the portland type, using Keiserman and Blumenthal's staining process. In the case of aluminous cements, setting and hardening occur as the result of the formation of crystals consisting of lime and alumina, with the retarded formation of amorphous, gelatinous mass consisting also of lime and alumina. The presence of lime hydroxide was not observed in the hydrated products. Supercements of the portland type were found, upon hydration, to behave as in the case of ordinary portland cements, the setting occurring as the result of the formation of crystals, and the hardening as the result of retarded impregnation and coagulation of amorphous mass among the fine network of crystals. Special attention was paid to the solubility of cements and crystallization of hydrated crystals out of once dissolved constituents in regard to the phenomena of setting and hardening. *Ceramic Abstracts* (1928), 209.

The Use of Triaxial Diagrams in Ceramics. The author, W. Schuen, describes how triaxial diagrams can be used to show the usefulness of various materials. An excellent review is obtained, in reading the article, of the chemical processes involved in the ceramics industry. Ten illustrations are included in the report which clarify the subject matter. Of particular interest is the illustration showing the triaxial position of portland cement, alumina cement, blast furnace slag, clay, porcelain, stoneware (vitreous) and Chamotte stone.—*Tonindustrie-Zeitung* (1928) 543-546.

The Heat Expansion of Fireproof Building Materials. The expansion of silica stone depends upon the chemical composition, degree and duration of the firing temperature, specific gravity, and size of particles. In Chamotte stone (a mixture of old refractory and new clay) the major factor is the chemical composition, although the temperature and duration of burning, porosity and grain size of the free kieselguhr (diatomaceous earth) enter into the results. Magnesite and carborundum are dependent upon the temperature alone.—*Stahl und Eisen* (1927) 1992.

Improvements in or Relating to the Burning of Cement. The apparatus consists of a kiln in which air is supplied through ring-shaped conduits arranged at various heights between the clinkering zone and the discharge end of the kiln.—*Arno Andreas, British Patent No.* 263,166.

Effect of Oil on Concrete. The author (Prof. O. Colberg) bases his conclusions on observations made on an arched concrete slab, which deteriorated after 20 years' exposture to the effect of lubricating oils. The first signs of deterioration appeared along the upper flanges of the steel beams supporting the slab. The oil gradually seeped through to the bottom flange, where the concrete began to break off leaving the reinforcement exposed. Strong corrosion of the latter set in. The concrete acquired a yellowish coloring and became so soft that it could be shaped by hand.

Such concrete does not have the fire resisting properties that concrete is supposed to have. The author found that combustion began at 270 deg. C. and that at 285 deg. C. the oil impregnated concrete burned with a large flame.

It was impossible to establish accurately the chemical processes which take place during deterioration. However, it is probable that the acid and phenol constituents of the oil react with the lime in the concrete, calcium soaps being the result. Fatty oils of animal and vegetable origin are also detrimental to the concrete and also form calcium soaps. Due to the lack of a suitable solvent no quantitative determination can be made of the lime present in organic and inorganic compounds in deteriorated concrete. An effort was made to isolate the oil by treating a large sample—430.73 gm. of the concrete—with neutral acetone. Upon decantation and filtration, the acetone was completely driven off in a vacuum. The remaining 14.69 gm. of a dark brown, only slightly transparent oil established the oil percentage in the concrete at 3.4%. The free organic acid was determined quantitatively as 2.14 mg. KOH required for the neutralization of 1 gm. of oil. The mg. KOH required to convert 1 gm. of oil into soap was found to be 10.8. The difference: $10.8 - 2.1 = 8.7$ indicates the numerical value of the acid constituents of the oil not yet converted into soap.

From the above it was concluded that the detrimental effect of the oil was mainly due to adulteration of lubricating oils during the war by fatty oils of animal and vegetable origin, for a good lubricating oil does not contain as much free acid as the value 2.14 would indicate.

The protective measures suggested to guard against the aggressive action of the oil are density of concrete, cement of low lime content and possibly an admixture of trass, although the latter remains ineffective without lime. A coat of neat portland cement grout is of great advantage.—*Beton and Eisen, April* 20, 1928.

Editorial Comment

Unfair Competition

Twice in this issue of ROCK PRODUCTS, in quoting producers of crushed stone, sand and gravel, has it been necessary to mention the problem of their meeting the competition of portland cement manufacturers under conditions that are rightfully considered *unfair*. No sand and gravel, crushed stone, or slag producer disputes the right of portland cement manufacturers to engage in the business of supplying aggregates to go with their cement. Indeed, from our own point of view, this is a very logical, and perhaps in some cases a necessary, step for portland cement manufacturers to take. More than any one else concerned they are interested in the *quality* of the aggregate produced and marketed, because portland cement itself is not truly a finished product, but merely one of the ingredients (the most important economically) in the finished product, which is mortar or concrete. Therefore portland cement manufacturers are rightfully interested in seeing that properly prepared aggregates are produced, marketed, and priced to the satisfaction of both consumer and producer; that this interest should in many cases extend to their going into the business of producing aggregates, or to their investment in allied or subsidiary companies producing aggregates, seems to us a most natural and logical development.

But, when they use their ability to supply cement as a club to compel the use of their aggregates, or when they practically give away aggregates at cost or less than cost, to sell cement, it is manifestly unfair to other producers of cement and of aggregates alike. The net result of such a policy cannot be otherwise than a demoralization of the markets for both cement and aggregates. Cement manufacturers to meet this kind of competition must either engage in the aggregate business themselves, with unneeded, uneconomical plants, or openly cut the price of cement. Aggregate producers can meet this kind of competition only by cutting prices, even below cost of production, thereby endangering the quality of the materials produced, and even endangering their sources of supply, since no concern wholly dependent on the aggregate business can keep going indefinitely on losing prices.

The cement and aggregate industries have so much in common—their whole future depends on *good concrete* at the lowest cost commensurate with quality—that it is unfortunate that there cannot be perfect harmony to attain their common ends. Both industries have so much to lose, and nothing to gain, by bringing their controversy into the open, that it is to be earnestly hoped they will not have to do so, although the two national aggregate associations appear to be fully aroused, and have committees at work on the problem right now. In this day of keener and keener competition the temptation to get business at any cost is certainly strong; but there is a future to be considered, and any cement company sales policy which does not take into consideration the necessity for a *common* purpose in promoting good concrete—cement, aggregates, and construction workmanship—is short-sighted, to say the least.

The Life of Associations

The trade or industrial association seems to be a permanently established institution in the United States. It certainly should be, because it is either a case of voluntary self-government of industries through such organizations, or the forced attention of government regulating agencies, and the hampering of industry through restrictive legislation. Granting that the trade association is an established institution in American business, what is to be the average life of the individual associations which go to make up this business structure? Will they survive the average length of life of the individual men who founded them, or will each generation have to start anew to learn the lessons of their predecessors?

The national association of the Gypsum Industries, going strong a year or two ago, has "passed out" entirely. The National Lime Association is but a shadow of its former self. The Portland Cement Association, under exactly the same business conditions, is going stronger than ever before. The National Sand and Gravel Association is considering the establishment of district engineering offices and an advertising campaign. The National Crushed Stone Association is embarking on a comprehensive research program, of as much, or more, interest to highway engineers as it is to crushed-stone producers. These three associations are looking forward and preparing for more business; they are organized to promote optimism and public service; they look for profit as a byproduct.

Why do some associations succeed where others fail? Probably every reader has the answer, for a trade association is no different from any other business organization. When it "rests on its oars" and is content with the laurels already gained, it is "on the skids." It can never stand still; it must go forwards, or backwards. To go forward requires the constant application of resourcefulness in brains, energy and time. If the initiative is not furnished by one or more member company officers, it need not be looked for in the association staff. And, it is one of the oldest established moral truths that an individual, organization or association which places selfish interest, or profit, above all other considerations is never able to attain that objective in the long run. Real profit, financial as well as intellectual, is ever the result of concentration on service and of giving the most value for the least consideration.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. com.[37]	12-30-27	3	7	
Allentown P. C. 1st 6's[37]	12- 5-27	90	92	
Alpha P. C. new com.	6- 4-28	44	47	75c qu. Apr. 14
Alpha P. C. pfd.[2]	6- 4-28	117	.....	1¾% qu. June 15
Amer. Aggregate 6's, bonds	6- 7-28	104	106	
Am. L. & S. 1st 7's[32]	2-24-28	101¾	102½	
American Silica Corp. 6½'s	6- 4-28	99	.....	
Arundel Corp. new com.	6- 4-28	48¼	48½	50c qu. Apr. 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	6- 6-28	No market		
Atlas P. C. com.	6- 5-28	43	46	50c qu. June 1
Atlas P. C. pfd.	6- 4-28	46	.....	66⅔c qu. Apr. 2
Beaver P. C. 1st 7's[26]	5-31-28	.....	100	
Bessemer L. & C. Class A[4]	6- 5-28	33¾	36	75c qu. May 1
Bessemer L. & C. 1st 6½'s[4]	6- 2-28	100¼	101½	
Boston S. & G. com.[16]	5-31-28	78	83	$1 qu. $1 x. Jan. 2
Boston S. & G. 7% pfd.[16]	5-31-28	85	90	1¾% qu. Jan. 1
Boston S. & G. 1st pfd.[16]	5-31-28	90	95	2% qu. Jan. 1
Canada Cem. com.	6- 5-28	31½	32	
Canada Cement pfd.[43]	6- 1-28	.....	99¾	1.62½ qu. June 30
Canada Cement 5½'s[11]	6- 1-28	101½	102½	
Canada Cr. St. Corp. 1st 6's[11]	5-18-28	96	99	
Certainteed Prod.	6- 4-28	48½	49	$1 qu. July 1
Chas. Warner com.	6- 4-28	35½	36½	50c qu. April 10
Chas. Warner pfd.	6- 4-28	109	.....	1¾% qu. Jan. 26
Cleveland Stone new st'k	6- 5-28	73½	77¾	50c qu. June 1, 25c ex. June 1, 50c Sept. 1
Consol. Cement 1st 6½'s, A[42]	6- 6-28	95	97	
Consol. Cement 6½ notes[24]	6- 6-28	94	98	
Consol. Cement pfd.[41]	6- 6-28	55	65	
Consumers Rock & Gravel 1st 7's[15]	6- 1-28	100	102	
Coosa P. C. 1st 6's[32]	12-28-27	65	75	
Coplay Cem. Mfg. 1st 6's[40]	6- 2-28	90	.....	
Coplay Cem. Com.[40]	6- 2-28	12½	.....	
Coplay Cem. pfd.[40]	6- 2-28	72½	.....	
Dewey P. C. 1st 6's[20]	6- 6-28	99	101	
Dolese & Shepard[7]	6- 6-28	157	160	$2 Apr. 1, $1.50 ex. Apr. 1
Edison P. C. com.[39]	5-19-28	50c	.....	
Edison P. C. pfd.[39]	5-19-28	1	.....	
Edison P. C. bonds[39]	5-19-28	75	.....	
Fredonia P. C. 1st 6½'s[32]	12-28-27	97	101	
Giant P. C. com.[25]	5-29-28	30	31	
Giant P. C. pfd.[25]	5-29-28	33	35	3½% June 15
Ideal Cement com.	6- 5-28	145	149	$1 qu. July 1
Ideal Cement pfd.[30]‡	6- 4-28	111½	112½	$1.75 qu. July 1
Indiana Limestone 6's	6- 4-28	97¼	97¼	
International Cem. com.	6- 4-28	71¼	72¼	$1 qu. July 1
International Cem. bonds 5's	6- 4-28	98¾	99	Semi-ann. int. payable June 15
Kelley Is. L. & T. new st'k	6- 5-28	52	55	62½c qu. July 2
Lawrence P. C.[2]	6- 4-28	108	112	2% qu.
Lehigh P. C.[2]	6- 4-28	50½	52	62½c qu. Jan. 1
Lehigh P. C. pfd.	6- 4-28	111	.....	1¾% qu. July 2
Lyman-Richey 1st 6's, 1921[13]	8-12-27	99½	100	
Lyman-Richey 1st 6's, 1935[13]	8-12-27	97½	99	
Marblehead Lime 1st 7's[14]	6- 2-28	100	.....	
Marbleh'd Lime 5½'s, notes[14]	6- 2-28	98	.....	
Mich. L. & C. com.	6- 4-28	35	.....	
Mich. L. & C. pfd.[6]	6- 2-28	24	27	1¾% qu. July 15
Missouri P. C.	6- 5-28	44	48	50c qu. May 1
Monolith P. C. com.[9]	5-31-28	15¾	16¼	8% ann. Jan. 2
Monolith P. C. pfd.[9]	5-31-28	9½	10	
Monolith P. C. units[9]	5-31-28	34¾	36¼	
National Cement 1st 7's[33]	5-31-28	99	101	
National Gypsum A com.[35]	6- 6-28	29	31	
National Gypsum pfd.[35]	6- 6-28	69	72	1¾% qu. Apr. 1
Nazareth Cem.[36]	5-31-28	31	32	75c qu. Apr. 1
Newaygo P. C.[1]	12-30-27	115	.....	
Newaygo P. C. 1st 6½'s[32]	2-11-28	120	.....	
New Eng. Lime pfd., A[22]	5-18-28	.....	95	
New Eng. Lime pfd., B[22]	6- 4-28	96	98	
New Eng. Lime com.[22]	6- 4-28	32	36	
New Eng. Lime 1st 6's[14]	6- 2-28	98	100	
N. Y. Trap Rock 1st 6's	6- 4-28	103	103	
North Amer. Cem. 1st 6½'s	6- 4-28	88	88⅝	
North Amer. Cem. units[19]	6- 1-28	45	55	2 mo. per at 7%
North. Amer. Cem. com.[19]	6- 1-28	5	10	
North Amer. Cem. pfd.[19]	6- 1-28	40	50	$1.75 qu. Aug. 1
North Shore Mat. 1st 5's[15]	6- 6-28	100	.....	
Northwestern States P. C.[37]	11-21-27	165	170	
Pac. Coast Cem. 6's. A	6- 1-28	.....	98	
Pacific P. C. new com.[5]	6- 1-28	.....	22	
Pacific P. C. pfd.	6- 1-28	.....	78	1.62½ qu. Apr. 5
Pacific P. C. notes[5]	3-22-28	99	.....	3% s.-a. Oct. 15
Pacific P. C. 6's	6- 1-28	.....	100	
Peerless Egyp'n P. C. com.[21]	6- 4-28	2	3	
Peerless Egyp'n P. C. pfd.[21]	6- 4-28	90	95	1¾% qu. July 1
Peerless Egyp'n P. C. war.[21]	6- 4-28	No market		
Penn-Dixie Cem. 1st 6's[29]	6- 6-28	100	101	
Penn-Dixie Cem. pfd.[28]	6- 7-28	94⅞	96½	1.75 qu. July 1
Penn-Dixie Cem. com.[28]	6- 7-28	28⅛	28⅞	50c qu. July 1
Petoskey P. C.	6- 5-28	11½	12¼	1½% qu.
Pittsfield L. & S.[31]	10- 8-27	.....	100	
Pittsfield L. & S. com.[31]	10- 8-27	.....	25	
Riverside P. C.	5-31-28	150	.....	50c mo. June 1
Rockland-Rockport Lime 1st pfd.[10]	5-17-28	.....	100	3½% s.-a. Feb. 1
Rockland-Rockport Lime 2nd pfd.[10]	5-17-28	.....	60	3% s.-a. Feb. 1
Rockland Rockport Lime com.[10]	5-17-28	No market		1½% qu. Nov. 2
Sandusky Cem.	6- 5-28	210	220	$2 qu. Apr. 2
Santa Cruz P. C. bonds	6- 1-28	105¾	.....	6% annual
Santa Cruz P. C. com.	6- 1-28	91	100	$1 qu. Apr. 1
Schumacher Wallboard com.	5-31-28	21½	22	50c May 15
Schumacher Wallboard pfd.	5-31-28	25½	25¾	
Southwestern P. C. units[44]	5-31-28	270	310	
Superior P. C., A	5-31-28	48	49	
Superior P. C., B[20]	5-31-28	35	38	
Trinity P. C. units[37]	6- 2-28	152	156	
Trinity P. C. com.[37]	6- 2-28	50	.....	
U. S. Gypsum com.†	6- 6-28	90½	91½	40c qu. June 30
U. S. Gypsum pfd.	6- 6-28	127	.....	1¾% qu. June 30
Universal G. & L. com.[8]	6- 6-28	1	2	
Universal G. & L. pfd.[8]	6- 6-28	.....	20	1½% Feb. 15
Universal G. & L., V.T.C.	6- 6-28	.....	2	
Universal G. & L. 1st 6's[8]	6- 6-28	50	60	
Upper Hudson Stone 1st 6's, 1951[32]	12-28-27	92	.....	
Vulcanite P. C. 1st 7½'s[32]	12- 5-27	105	109	
Whitehall Cem. Mfg. com.[36]	6- 5-28	150	.....	
Whitehall Cem. Mfg. pfd.[36]	6- 5-28	98	.....	
Wisconsin L. & C. 1st 6's[15]	6- 6-28	100	.....	
Wolverine P. C. com.	6- 6-28	6	6½	15c qu. May 15
Yosemite P. C., A com.	1- 4-28	6	.....	

†10% stock dividend, July 10. ‡If approved at stockholders' meeting June 15, Ideal Cement preferred holders will be offered $1100 5% 15-year convertible debentures in exchange for each $1000 par amount of preferred; preferred not exchanged will be redeemed at $110 and accrued dividends.

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, Chicago, Ill. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Asbestos Corp. of Amer., 5 sh. pfd., 5 sh. com.[3]	$1 for the lot	.....
Atlanta Shope Brick and Tile Co[1]	25c	.....
Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1]	$400 for the lot	.....
Benedict Stone Corp. 1st 7's 1934[8]	.....	86
Blue Stone Quarry, 60 sh.[2]	$10¾ for the lot	.....
Eastern Brick Corp., 7% cum. pfd.[1]	40c	.....
Eastern Brick Corp. (sand lime brick) com.[1]	40c	.....
International Portland Cement Co., Ltd., pfd.	30	45
Globe Phosphate Co., $10,000 1st. mtg. bonds, $169.80 per $1000 paid on prin.	$50 for the lot	.....
Iroquois S. & G. Co., Ltd., 2 sh. com., 3 sh. pfd.[2]	$12 for the lot	.....
Knickerbocker Lime Co.[4]	105	.....
Missouri Portland Cement Co., 7% serial bonds	104¾	104¾
Olympic Portland Cement Co.[7]	.....	£1¾
Phosphate Mining Co.[1]	1	.....
River Feldspar & Mill'g Co., 50 com., 50 pfd.[1]	$200 for the lot	.....
Rockport Granite Co., 1st 6's, 1934	90	.....
Simbroco Stone Co.[2]	12	12
Simbroco Stone Co.,[9] 40 sh. pfd., par $50; 40 sh. com., par $10 (40 units)	$2 per unit	.....
Southern Phosphate Co.[6]	1¼	.....
Standard Gypsum Co., 10 sh. pfd., 5 sh. com.[1]	$35 for the lot	.....
Tensas Gravel Co., 180 sh. com.[1]	$1 for the lot	.....
Tidewater Portland Cement Co., 3000 sh. com.	$6525 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Wabash Portland Cement Co.[1]	60	100
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by R. L. Day and Co., Boston. [3]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [7]Neidecker and Co., London, England. [8]Auction sale of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [9]Price at auction May 2, 1928, by Wise, Hobbs & Arnold, Boston.

Details of Ideal Cement Refinancing

THE present capital structure of the Ideal Cement Co. consists of originally authorized preferred stock in the amount of $12,500,000, of which there is now outstanding $7,725,400, and authorized common stock in the amount of 250,000 shares, without par value, of which there is now outstanding 200,056 shares.

Subject to the favorable action of the stockholders in the proposed plan of recapitalization at the meeting called for June 15, 1928, it is proposed to proceed as follows:

1. To issue as of July 1, 1928, $8,500,000 in 15-year 5% convertible gold debentures, callable at not to exceed 105, and to offer such debentures in exchange for the outstanding preferred stock at the rate of $1,100 in debentures for each $1,000 in preferred stock.

2. To offer for subscription at $100 by both preferred and common stockholders any debentures not issued in exchange for preferred stock.

3. To sell to underwriters such of the above debentures as are not exchanged for preferred stock or are not subscribed for by stockholders.

4. To call for redemption at 110 and dividends, any preferred stock not exchanged for debentures.

5. To issue new common stock as of July 1, 1928, in the ratio of two shares for each one share of common stock now outstanding.

Assuming the consummation of the foregoing proposal, the capitalization of the company will then consist of $8,500,000 debentures, all of which will be outstanding, and an authorized 600,000 shares of common stock, without par value, of which 400,112 shares will be outstanding, and of which not to exceed 111,765 shares will be reserved against conversion of debentures, as follows: From July 1, 1928, to July 1, 1929, at the rate of $75 per share; thereafter to July 1, 1930, at the rate of $80 per share; thereafter to July 1, 1931, at the rate of $85 per share; thereafter to July 1, 1932, at the rate of $90 per share; thereafter to July 1, 1933, at the rate of $95 per share.

Notice is hereby given to all preferred stockholders that, subject to the adoption by the stockholders of the proposed plan of recapitalization, preferred stockholders of record June 15 will be accorded the privilege of exchanging preferred stock for debentures on the basis above set forth. This privilege will expire June 30. Debentures will be issued in denominations of $100, $500 and $1,000, and adjustments in cash will be made on any fraction of $100 to which any preferred stockholder may be entitled.

It is anticipated that commencing October 1, 1928, the dividend on the new common stock will be of $3 per share per annum.

Proper provision has been made for the purchase of the probable amount of unexchanged or unsubscribed debentures through an underwriting agreement, for compensation, with Boettcher & Co. and Newton & Co., who are represented on the board.

It is estimated that the proposed recapitalization of the company will result in a saving averaging approximately $200,000 per annum, or at the rate of $1 per share on the present outstanding common stock, in addition to which, through conversion or payment of the debentures, will ultimately have outstanding only one class of stock preceded by no funded indebtedness.

Olympic Portland Cement Co.'s Production and Earnings

PRODUCTION for the past year at the companys works at Bellingham, Wash., amounted to 689,774 bbl. of finished cement, and there were sold and delivered 689,064 bbl. The plant was run at full capacity for about nine months and at two-thirds capacity for one month. Prices realized were about the same as in the preceding year.

Production of raw materials amounted to 187,177 tons of limerock and 27,525 tons of clay. About 28,342 tons of cement, coal and bags were shipped over the wharf. The limestone quarry which was acquired in 1926 is now being opened up and new crushing plant installed; it is expected that supplies will be drawn from it during the second half of the present year.

The net profit for year ended December 31, 1927, amounts to £80,891 ($394,343.62), to which is added £21,593 ($105,265.87) brought in, making at credit of profit and loss account £102,483 ($499,604.62). Depreciation written off by £20,000 ($97,500.00), there has been transferred to reserve fund £20,000 ($97,500.00), and to reserve for extension of property £9,000 ($43,825.00). The directors recommend a final dividend of 10%, less income tax, making 15% for the year, carrying forward £23,483 ($114,479.62).—*The Quarry and Surveyors' and Contractors' Journal,* London, England.

New Penn-Dixie Cement Shares Listed

THE New York Stock Exchange has authorized the listing of 5,888 additional shares (par $100) series "A," convertible 7% cumulative preferred stock, with authority to add to the list 8,832 additional shares of common stock without par value, upon official notice of issuance on conversion of the preferred stock; making the total amounts applied for $13,588,800 of preferred stock, and 603,832 shares of common stock.

The company has bought at a sheriff's sale the plant and properties of the Pyramid Portland Cement Co. of Iowa. These properties are subject to a lease to the Pyramid Portland Cement Co. of Delaware. In order to acquire immediate possession and the ability to operate the plant and properties of the Iowa corporation, the company has acquired the total authorized number of shares of stock of the Pyramid Portland Cement Co. of Delaware (1,000 shares without par value), thus obtaining control of the lease, together with $446,500, aggregate principal amount, first mortgage bonds of the Pyramid Portland Cement Co. of Iowa, for $224,266 in cash, and 5,888 shares of its series "A" convertible 7% cumulative preferred stock.

International Cement Bonds Sold at 97

HAYDEN, STONE & CO., New York City, have sold at 97 and interest, to yield about 5¼%, $18,000,000 20-year 5% convertible gold debentures of the International Cement Corp. These replace the entire previous issue of preferred stock.

The bonds are dated May 1, 1928; due May 1, 1948; interest payable May and November at the Equitable Trust Co., New York, trustee, without deduction of normal federal income tax up to 2% per annum. Pennsylvania and Connecticut 4 mills taxes, Maryland 4½ mills tax, District of Columbia and Michigan 5 mills taxes, and Massachusetts income tax up to 6% per annum to be refunded. Denominations, $1,000 and $500. Redeemed all or part by lot, on 30 days' notice at any time at 105 and interest if called for redemption on or before April 30, 1929, the premium decreasing ¼ of 1% on each May 1 thereafter.

The bonds are convertible at the option of the holders into common stock at the following rates per $1,000 debenture: Up to May 1, 1933, into 11 shares; thereafter up to May 1, 1938, into 10 shares; thereafter up to May 1, 1943, into 9 shares and thereafter up to May 1, 1948, into 8 shares. If debentures are called for redemption the right to convert is to extend only up to 5 days prior to the date fixed for redemption.

Capitalization—	Authorized	Outstanding
20-year 5% conv. gold debs., due 1948 (this issue)	$18,000,000	$18,000,000
Common stock (no par value)	*1,000,000 shs.	618,750 shs.

*198,000 shares reserved for conversion of debentures.

BALANCE SHEET, FEBRUARY 29, 1928
(Giving Effect to Present Financing)

Assets:	
Cash	$1,409,105
Accounts and notes receivable	2,042,464
Inventories	5,540,348
Deferred charges	1,692,689
Investments	29,202
Plant sites, etc.	41,040,882
Total	$51,754,690
Liabilities:	
Accounts payable	$1,787,397
Taxes payable	460,836
Employes' subscription to stock	420,736
Surplus reserved for subsidiary companies, etc.	86,923
Reserve for contingencies, etc.	351.263
Deferred credits	57,712
Capital stock of subsidiary companies not owned	129,304
20-year 5% convertible debentures	18.000,000
Common stock (618,750 shares)	21,014,938
Earned surplus	9,445,581
Total	$51,754,690

Rockland and Rockport Lime Corp. Earnings

THE FOLLOWING EARNINGS and financial statement for 1927 are reported for the Rockland and Rockport Lime Corp., Rockland, Me., and the affiliated Hoosac Valley Lime Co., North Adams, Mass.:

RESULTS FOR THE YEAR ENDED DECEMBER 31, 1927

	Rockland and Rockport Lime Corp.	Hoosac Valley Lime Co., Inc.	Lime Rock Railroad Co.	Rockland Transportation Co.	Total
Gross income	$1,353,667	$129,338	$120,924	$55,200	$1,659,129
Operating expenses	1,305,420	124,411	105,312	15,411	1,550,555
Net operating profit	$48.246	$4,927	$15,611	$39,788	$108,574
Other income (net)	12,053	226	2,644	632	9,003
Net operating profit	$60,300	$5,153	$12,967	$39,156	$117,577
Interest, depreciation and depletion	86,430	4,823	17,646	20,858	129,759
Net income	def.$26,130	$330	def.$4,679	$18,297	def.$12,181
Dividends paid	95,117			9,000	104,117
Net addns. to or ded. from surplus	*$121,247	†$330	*$4,679	†$9,297	*$116,298
Surplus deductions	15,761	419	233	994	17,408
Surplus January 1, 1927	486,006	90,845	134,784	21,460	733,097
Surplus December 31, 1927	$348,997	$90,756	$129,871	$29,763	$599,390

*Debit. †Credit.

No depletion has been charged to operations during the current year on the books of the Rockland and Rockport Lime Corp.

Beaver Board Earnings for 1927

BEAVER BOARD and subsidiaries earned $4.51 a share on the 7% preferred stock in 1927 against $4.40 a share on the preferred stock in 1926.—*Chicago* (Ill.) *Journal of Commerce.*

U. S. Gypsum Votes 10% Stock Dividend

PREDICTIONS of the offering of valuable rights to shareholders of the United States Gypsum Co. were fulfilled on June 1 when directors of the company voted to offer common stockholders the privilege to purchase additional common stock at par, $20, to the extent of 50% of their holdings. In addition a 10% stock dividend was declared, payable July 10 to stockholders of record June 15.

The rights, accruing to common stockholders of record July 14 and expiring October 1, give holders the opportunity to purchase one additional share for every two shares held, giving the rights a market value of approximately $26 a share. The subscriptions are to be paid in four equal installments on October 1, 1928, February 1, June 1 and October 1, 1929, respectively. Interest will be paid on all installments at the rate of 5% annually from the due date of each installment until October 1, 1929, the date when the new stock will be issued. The stock warrants shall be issued on or before July 31, 1928.

The funds realized from such offering of stock will amount to $7,604,440 and are to be used for the immediate construction to complete gypsum plants at Chicago, Philadelphia and Detroit. The eastern plants will be built on property owned by the company in the heart of Philadelphia and will receive gypsum from Nova Scotia in the company ships, as will the Boston plant now under construction. The Chicago and Detroit plants will receive gypsum by lake steamers from Alabaster, Mich., on Lake Huron.

The stock dividend is the first distribution of shares that has been made by the company since December 31, 1926, when 35% in stock was paid. On December 31, 1927, an extra cash dividend of $1 a share was paid. Other cash distributions since the first of last year have been at the rate of $1.50 a share annually.—*Chicago* (Ill.) *Journal of Commerce.*

New England Lime Co. Earnings

THE following shows the New England Lime Co.'s earnings for the years 1927 and 1926:

STATEMENT OF INCOME FOR YEARS ENDED NOVEMBER 30

	1927	1926
Net sales	$1,629,032	$1,798,010
Net after depreciation	207,567	322,824
Federal taxes	14,900	41,665
	$192,667	$281,159
Interest on funded debt	79,750	81,000
	$112,917	$200,159
Preferred stock dividend, Series A	42,000	42,000
	$70,917	$158,159
Preferred stock dividend, Series B	28,000	28,000
Net applicable to common stock	$42.917	$130,159
Earned per share Series B	17.73	39.54
Earned per share common	1.43	4.33

Riverside Portland Reorganization

REORGANIZATION of the Riverside Cement Co., Los Angeles, Calif., has been announced in a letter to the stockholders. The company will be reincorporated under a Delaware charter with 70,000 shares first preferred, 240,000 of the class A common, and 400,000 of the class B common.

The present stockholders will receive one share of preferred stock and four each of the class A and class B common for each share now held.

Penn-Dixie Stockholders Approve Consolidation

STOCKHOLDERS of Pennsylvania-Dixie Cement Corp. have approved a plan to consolidate with the North American Cement Corp., and to form a new company to be known as General Cement Corp. The consummation of the merger is likely to be delayed for some time, it is said, by the adjustment of details. Stockholders of the North American corporation previously had approved the plan.

Certain-teed Products First Quarter Earnings

CERTAIN-TEED PRODUCTS CORP. for the quarter ended March 31 reports a net profit of $3042 after depreciation and federal taxes, against $342,797 in the first quarter of 1927.—*Chicago* (Ill.) *Journal of Commerce.*

Recent Dividends Announced

Certain-teed Prod. (quar.)..$1, July 1
Certain-teed Prod. pfd. (quar.) ..$1.75, July 1
Cleveland Stone (quar.)..50c, Sept. 1
Giant Portland Cement pfd...3½%, June 15
Ideal Cement com. (quar.)..$1, July 1
Ideal Cement pfd. (quar.)....$1.75, July 1
Indiana Limestone pfd. (quar.) ..$1.75, June 1
Lehigh Portland Cement pfd. (quar.) ..$1.75, July 2
U. S. Gypsum com. stock..... 10%, July 10

CONDENSED BALANCE SHEET FIGURES
(Audit Figures)

	November 30— 1927	1926	1925
Assets:			
Cash	$358,139	$256,618	$224,498
Receivables	94,454	128,623	100,166
Inventories	155,335	140,346	158,802
	$607,928	$525,587	$485,466
*Quarries, buildings, machinery, etc.	3,633,416	3,697,384	3,689,728
Investments	59,190	108,078	.....
Bond discounts, etc.	123,710	139,796	146,359
Total	$4,424,244	$4,470,845	$4,319,553
Liabilities:			
Payables	$18,601	$8,332	$2,869
Accrued wages, interest, preferred dividends and federal taxes	75,675	108,171	79,001
	$94,276	$116,503	$81,870
First mortgage 6s, 1935	1,300,000	1,350,000	1,350,000
7% preferred stock, Series A	600,000	600,000	600,000
7% preferred stock, Series B	400,000	400,000	400,000
30,000 shares no par common stock	1,788,523	1,788,523	1,788,524
Surplus	241,445	215,319	99,159
Total	$4,424,244	$4,470,845	$4,319,553
Net working capital	$513,652	$409,084	$401,596

*After reserves for depreciation and depletion.

National Lime Association Takes On New Lease of Life

New York Convention Decides to Increase Dues and to Develop Local Group Associations

A REPRESENTATIVE GROUP of American lime manufacturers met in earnest conference at New York City, May 23 and 24, and discussed in detail some of the problems of the lime industry and some of the ways and means to cure them. Nothing revolutionary was expected, nor is yet the result of this convention. There will be no changes in the present scheme of organization of the existing National Lime Association; but the dues are doubled, from 1c. to 2c. per ton on the 1927 output. This is expected to give the association an annual budget of between $40,000 and $50,000.

Most of the constructive work of the convention was done by a committee of which Bernard L. McNulty, president of the New England and the Marblehead Lime companies, Chicago, was chairman. The other members of the committee were J. L. Durnell, the Van Sciver Corp. (Knickerbocker Lime Co.), Philadelphia, Penn.; George B. Wood, president of the Rockland and Rockport Lime Corp., Rockland, Maine; Reed C. Bye, Charles Warner Co., Philadelphia, Penn., and John M. Chiles, Austin White Lime Co., Austin, Texas.

The report of this committee was as follows:

"Your committee on organization has the following recommendations to make, based on their unanimous opinion that the association must proceed on a broader and more constructive basis or else cease to exist.

"Commencing July 1, 1928, the dues for the next fiscal year shall be two cents (2c.) per ton for burned lime products sold during the calendar year 1927.

"That all outstanding certificates of indebtedness be paid in full at maturity.

"That necessary steps be taken immediately to dispose of the present lease on the offices at Washington and that less expensive space be obtained to care for the smaller organization. That the surplus furniture and office equipment be sold, but that the laboratory equipment be retained for future use.

"That an executive committee of five (5) be elected, which shall assume the active management of the association; this executive committee to elect its own chairman. The directors shall meet with the executive committee at least twice a year, or more often, at the discretion of the executive committee.

"That a capable business man (preferably not in the industry) be employed as general manager to direct the activities of the association, but whose principal duty shall be to assist in the organization of the membership into district groups, and to render real service to individuals and groups to more actively promote the lime industry in the manner best suited to various sections as groups are organized.

S. W. Stauffer, chairman of the New York convention

"That a headquarters organization be maintained which will be capable of representing the industry properly and intelligently in its contact with the public.

"From the funds available technical research will not be possible in the association's budget but should be carried on in commercial laboratories from special funds appropriated by group organizations.

"That the invitation of the United States Treasury Department to appoint a committee of operating men to co-operate with government agencies be accepted, and this committee shall establish a standard depreciation schedule for plants and equipment, and from this basis vigorously pursue lines of study that will help to establish true cost records throughout the industry."

It was decided that any radical changes in the scheme of organization at this time would be inopportune, for the eastern members of the association are strongly wedded to the idea of a national organization composed of a federation of local group organizations. It was evidently the consensus of opinion that the development of local group organizations as decided upon at the White Sulphur convention in 1927 had not been entered upon as whole-heartedly as it should have been; and that a special effort should now be made to promote their organization and their co-operation in a national way.

A permanent executive committee empowered to work out a national organization along these lines was appointed, consisting of the following members: John M. Deeley, Lee Lime Corp., Lee, Mass.; J. L. Durnell, Van Sciver Corp., Philadelphia, Penn.; J. M. Gager, Gager Lime Manufacturing Co., Chattanooga, Tenn.; A. B. Mack, Kelley Island Lime and Transport Co., Cleveland, Ohio, and Harry B. Mathews, Mississippi Lime and Material Co., Alton, Ill. R. P. Wilton, Steacy and Wilton Co., York, Penn., was elected treasurer.

Outside Spokesmen

One luncheon address was by Francis H. Sisson, vice-president of the Guaranty Trust Co., New York City, who forecast business conditions, in general, as encouraging.

The other luncheon address was by Charles F. Abbott, executive director, American Institute of Steel Construction, New York City, extracts from which follow:

Basic Problem of Industrial Organization

"Behind imposing records of increasing production and sales there lies a dramatic story of a sharp competitive struggle increasing in interest. It indicates that business is not altogether as easy to get as it was in 1918 and 1919, and that the profits today go to those who are able to cope with the steadily narrowing profit margin.

"Wherever you go you find the general complaint that volume of business is high but prices and profits are low. The lack of profit from sales is unquestionably the greatest problem in industry. A concern not making a reasonable profit is a liability to society and it should be as illegal to accept business on a basis of cost or less than cost as it is to agree to maintain prices.

"If it is impossible to make satisfactory profits during active periods, then what may we expect should we enter a period of possible business depression.

"The problem of production and finance have been largely solved. We are now face to face with the problem of distribution, or scientific marketing and selling.

"Today, old markets, if we are to hold

John M. Deeley, member of the executive committee

them, must be intensively cultivated. New outlets must be developed in order that excess plant capacities may be fully absorbed. Orders are not lying around to be picked up without effort.

"There are many who believe that our principal problem is that of excess plant capacities. While it is true that undoubtedly there is excess production in some industries, the fact remains that in many cases this excess capacity has been caused by a shrinkage in the market due to outside competition. As the market has declined excess capacities have been created.

"We must learn the story of stabilization and accept the idea that it would be a great deal better to operate on a basis of 60% at a profit rather than to make any attempt to operate a plant at 100% on a basis of cost or less than cost. The danger to American industry is not entirely a lack of business, but the failure to maintain prices that include a reasonable profit. We must realize that million times nothing is still nothing.

"Today, economics occupies the center of the stage. Alliances are built upon a mutual exchange of coal for iron, or manufactured goods for raw materials. The creation of a steel or chemical trust is front page news. Progress is measured by the curve of production, of sales or the volume of power in kilowatt hours.

New Competition Calls New Merchandising Policies

"Increased competition to meet new conditions has developed, and to a large extent is responsible for most of our present-day difficulties. The transition we are witnessing is bringing with it a new competition which in turn calls for a radical readjustment of merchandising policies.

"Within the memory of all of us, competition was little more than a cut-throat fight between salesmen representing different houses in the same line. It was full of suspicion, hate and jealousy.

"In the days gone by we can all remember when it was permissible for competitors to get together and agree upon prices and restrain competition. Then came the Sherman law, which made illegal such practices. Under the new conditions thus created a new situation has been developed and today we are face to face with new economic problems. To meet such a condition individual effort is absolutely hopeless. The only way that we can cope with these new conditions is through the power of a national cooperative organization. We find in many instances that buyers are dictating the terms, that they are the better sellers, and that industry to a large extent has lost control and has failed to dominate through aggressive control all the terms and prices. The fight is being waged for a part of the consumer's dollar and the number of those dollars is limited. The industry that recognizes this fact and is prepared to engage in this struggle will naturally obtain the larger part, whereas those who are neglectful will naturally suffer in consequence.

"The old type of competition no longer exists to any extent, partly because it does not pay, but largely because industry is awakening to a realization that the competition most to be feared is not that existing between concerns in the same business.

"At the present time, the majority of our worries are caused by competition coming from manufacturers in an entirely different line of business. We now find industry organized against industry for the purpose of encroaching upon the market of another by substitution of products. We have discovered that our once actively responsive markets no longer exist.

"Now we are witnessing the new competition where the products of one industry are displacing those of another. New methods to combat it are necessary.

Huge Sums Required To Fight for Markets

"The lumber industry refused to recognize the competition of lumber substitutes which was seriously affecting its business, and now we learn that the industry has appropriated $25,000,000 for advertising in the hope that a part of the lost market may be regained.

"Of even more startling significance than the growing competition between industries is the competition between various sections of the country in the struggle to find buyers for the commodities upon which their prosperity depends. In some cases the chief commodity is the climate and so we find Florida vieing with California to secure the tourist trade. Even more recently, Hawaii has entered the lists, and now looms as a rival of the older playgrounds of the nation. But this intersectional competition is by no means confined to efforts to bring the holiday seeker to the various parts of the country most favored by nature.

"A short time ago Atlanta appropriated a million dollars to establish its industrial supremacy in the South and I wonder what Birmingham, Memphis and New Orleans are going to do to meet this new competition.

"The New England states have united to modernize their industries and tell the world about the merits of New England's products. Hard pressed by competition from more recently industrialized districts, the welfare of every man, woman and child in the New England states will be affected for good or ill by the outcome of this experiment.

"Let us take one of the most difficult of all products, that of granite.

"The 'Rock of Ages' granite campaign has been eminently successful. It has sold the public on the superiority of granite for hewn memorials. In slack periods it has enabled the quarries and manufacturers to operate on a more nearly normal schedule than the producers of competitive materials. In a highly competitive industry it has helped to stabilize prices by advertising with nothing to sell but the unfinished material—'the sentiment in the rough'—the 'Rock of Ages' quarries have given the world a new conception of an obligation that is as old as man.

"Recently a New York banker made the statement that future profits will depend upon application of intelligent, aggressive salesmanship. But salesmanship based upon a greedy determination to secure all the business in sight I would put as a principal cause of the present day demoralization, of the business man's mental attitude in our other industries. The fundamental principles of salesmanship, of proper pricing, of costs and profits are cast overboard, as hysteria is substituted for sound judgment.

A Modern Philosophy of Selling

"Under present day conditions, the most important phase of business is selling. Every successful business man is first of all a sales-

J. L. Durnell, member of the executive committee

man; every farmer, every lawyer, every doctor. There are doctor with profound medical knowledge who scarcely make a bare living. There are others with far less knowledge who are making $50,000 or more a year because they know how to hold on old woman's wrist sympathetically and tell her that her husband does not understand her delicate nervous temperament. The whole economic problem of life is salesmanship.

"The public have no consciousness of price. We all know that if we tell the people often enough and use enough pictures we can change the buying habits of a nation.

"Charles M. Schwab, chairman of the Bethlehem Steel Co., recently made public the statement that the Bethlehem Steel Co. had expended $167,000,000 in plant improvements and had given away this huge saving in other directions, undoubtedly due to inefficient salesmanship.

"Industrial organization well equipped can write the formula for good cooking, but it is helpless when it comes to making good cooks.

"The individual concern has found itself totally unable to cope with the new struggle for markets. The forces that can be marshalled against it are too great. The battle line is too far-flung. The vision to see that the individual concern can prosper only as the industry prospers offers the sole hope of survival.

"Such co-operative activity, aimed primarily at better merchandising methods, offers the assurance of prosperity during the period of transition that is bringing into the limelight, as the future problem, the locating of buyers to absorb what we produce—to make them want what we have for sale.

"In this new competition of one industry against another, it behooves all to co-operate to the height of their ability to bring to the door of the consumer its more serviceable way.

Local Associations Not the Answer

"There are many members of an industry who feel that their problems can be solved through local associations, but this is a mistaken idea. Most of the problems confronting industry are national in their scope and can only be met and overcome through the power of a national organization. It is well to have local groups or associations to supplement the work of a national organization, but if they are to depend upon local action then their efforts will prove hopeless if they expect to overcome the more important problems, which are entirely national in their origin.

"We oftentimes meet the objection that our business is different from all others and what might go in one industry might not apply to ours. This is another mistaken idea because businesses differ only in details, the principle being the same whether we are dealing in aeroplanes, celluloid, structural steel or toothpicks. We must inspire in the minds of all members of an industry the spirit of the industry and leave them to submerge their own individual selfish motives for the good of the whole.

"We also find in many instances a belief on the part of some of the larger concerns that the smaller companies should be eliminated. This is another false conclusion because if the smaller concerns were eliminated today we would be confronted with another crop tomorrow that might give us even greater difficulty. The broader viewpoint would be to gather the small companies under our wing and give them the benefit of a wholesome education and it has been my experience that the smaller concerns are only too anxious to profit through such constructive leadership. The small company has a right to its existence and is entitled to its proportion of the business.

"You should know the mental attitude of any company whose plant is in need of business. They might be likened to a boa constrictor who wiggles his way out of the jungle and is vicious because he is hungry. Throw him a piece of bread and he will quickly swallow it and find his way back into the jungle to go to sleep and he is harmless.

Fallacy of Big Volume Business

"Many business men seem to have lost all sense of proportion in a wild scramble to maintain volume. The idea to keep a competitor from getting any business at all seems to be the prevailing thought.

"In a city that I recently visited we put the capacity and consumption statistics on a

J. M. Gager, member of the executive committee

blackboard and it was found that the production facilities amounted to 100,000 tons, whereas consumption averaged about 52,000 tons. Under such conditions it was obvious that if everyone made the attempt to get all the business in sight that chaos would prevail. How much better it would be for competitors to get together and recognize such a condition, and through united, concerted effort make possible increased consumption and regain the business they had undoubtedly lost through the more aggressive action on the part of outside competition.

"In the city of San Francisco the garbage is collected by scavengers. They got together and organized an association and are conducting their business on a satisfactory, profitable basis. If the scavengers of San Francisco recognize the benefits of co-operative association then it seems to me that intelligent business men would more quickly recognize the fundamental principle involved.

Organization of the American Institute of Steel Construction

"The individuals comprising the structural steel industry were quick to realize the vital need of a national organization. The American Institute of Steel Construction was launched with a very definite and practical four-year program.

"They embodied within this program a unique idea in that the principal objective was to further the interests of the public, following which they were sure the industry could derive benefits. In other words, they insisted that public interests should supercede all other motives.

"Since that time they have sincerely carried out this thought with the result that their standard specification covering steel design has made an annual saving of approximately $30,000,000 wherever steel is used for building purposes. Their 'Code of Standard Practice' is based upon actual results and not mere ethics. The use of this code establishes the relationship between the buyer and seller and has eliminated controversies and added further economies of benefit to the public. New fireproofing specifications have been prepared which will make further reductions in costs.

"A corps of 10 district engineers has been organized whose duties will be to first sell steel, recognizing the fact that the more steel that is sold the more business there will be for each individual.

"The preparation of a standard sales manual is teaching the members of the industry to apply aggressive and intelligent salesmanship.

"The publication and distribution of over 30,000 copies of the 'Standard Handbook of Steel Design' has established the authoritative position of the institute and its services have been generously recognized.

"Advertising and publicity have been directed towards the development of a national association of steel, and the public recognition of the industry and its services.

"Technical research and the establishment of scholarships in universities is leading the structural steel industry to improvements which further advance the interests of the public. Its advocacy of the use of steel in private residences is a feature of this program.

Association Dues Not an Expense—An Investment

"The question of income is one of general concern to members of the industry and there seems to be a feeling that money appropriated for any national association work is an item of expense which seems to be regretted. What difference does it make whether a single company contributes 5 cents or a dollar on each ton it sells, as long as all members pay like amounts, add them to their cost systems and collect from the public, transferring these collections to their national association to be intelligently and judiciously invested for the purpose of extending the market on a more intelligent and economic basis? While the public pays but a small amount, the benefits it derives through such economies far offset the price charged.

"It is a mistaken idea for anyone to believe that an industry can take all out of the market without reinvesting any thought, time or attention in promoting, protecting or advancing the market to insure permanency. We might liken such a situation to the farmer who has continuously taken out of his land until the soil becomes impoverished and sterile. The better way would be to apply fertilizer at frequent intervals and adopt modern methods of agriculture; when doing so the crops are increased and the productivity of the farm improved. It is so in business, and when the time comes that the members of an industry will recognize the vital need of investing a part of their income in the development of their market then we are going to experience progress and hear less talk about excess plant capacities.

"Markets will be extended, consumption increased and individual companies will profit through a better knowledge of business fundamentals wherein the application

of this better understanding will develop increased sales no matter whether they are large or small units of the industry in question. To broaden the market and encourage co-operative effort and the application of better methods will become the chief aim of each industry.

Merit of Product Alone Will Not Sell It

"The new competition unquestionably is bringing with it a tremendous expansion of opportunity for co-operative organization. Regardless of the merits of the article produced by the industry as a whole, the public will buy only when convinced of its worth.

"It has been demonstrated over and over again that we do not act in accordance with the facts, but in accordance with the facts as we believe them to be—with the picture that is prepared for us. The picture accepted by the public is always that which has been painted with deliberate intent.

"Every industry, whether centered in a few states or scattered throughout the nation, is the competitor of every other industry engaged in producing materials that can be substituted for its product. Each is fighting for a share of the consumer's dollar, and the number of dollars is limited.

"This does not mean that there should be any less effort to promote sales. The reverse is true. The industry that is broadening its market is giving its members more room in which to grow. It is making more certain that effort to increase sales will meet with a receptive attitude by the consumer."

Entertainment

The Valve Bag Co. of America, Toledo, Ohio, represented at the convention by L. H. Hartman, Carl Hartman and Burton H. Ford, were hosts to the lime manufacturers' and their guests at a dinner and dance.

Registration of Lime Producers

Allyndale Lime Co., Hartford, Conn., F. W. Barhoff, Jr.

American Lime and Stone Co., Bellefonte, Penn., S. M. Shallcross, G. J. Purnell.

Annville Lime Co., Annville, Penn., J. P. Hennesey, S. C. Deitzler.

Ash Grove Lime and Portland Cement Co., Kansas City, Mo., J. F. Pollock.

Austin White Lime Co., Austin, Texas, J. H. Chiles.

J. E. Baker Co., York, Penn., S. W. Stauffer.

Batesville White Lime Co., Batesville, Ark., Geo. T. Weigart.

Brewer Co., Worcester, Mass., H. V. Brewer, K. M. Nahikian.

B. and C. Lime and Stone Co., Ashville, N. C., J. W. Grimes.

Campbell Stone Co., Indian River, Mich., C. A. Campbell.

Cheney Lime Co., Birmingham, Ala., F. C. Cheney.

G. and W. H. Corson Co., Plymouth Meeting, Penn., Bolton L. Corson, Philip L. Corson.

Dittlinger Lime Co., New Braunsfels, Texas, H. Dittlinger.

Gager Lime Manufacturing Co., Chattanooga, Tenn., J. M. Gager.

Glencoe Lime and Cement Co., St. Louis, Mo., E. S. Healey.

Burton K. Harris, Saylesville, R. I.

Hoosac Valley Lime Co., North Adams, Mass., William Flaherty, George Martin.

Hunkins-Willis Lime and Cement Co., St. Louis, Mo., Gordon Willis.

Indiana Limestone Co., Bedford, Ind., John G. Drummond.

Kelley Island Lime and Transport Co., Cleveland, Ohio, A. B. Mack, E. L. Osborn.

Lee Lime Corp., Lee, Mass., John M. Deeley, John F. Deeley.

Legore Lime Co., Legore, Md., George Legore.

Limestone Products Corp., Newton, N. J., N. S. Meyers.

Marble Cliff Quarries Co., Columbus, Ohio, Russell Rarey, E. C. Powers.

Marblehead Lime Co., Chicago, Ill., B. L. McNulty.

F. W. Menke Stone and Lime Co., Quincy, Ill., R. B. Menke.

R. P. Wilton, new treasurer of the National Lime Association

Miller Lime Products Co., Great Barrington, Mass, F. A. Daboll.

Mississippi Lime and Material Co., Alton, Ill., H. B. Mathews.

New England Lime Co., Pittsfield, Mass., A. V. A. Felton, C. C. Loomis.

North American Cement Corp., Security, Md., John F. Gruber, Marshall E. Reed.

John D. Owens and Sons, Owens, Ohio, B. H. Rice.

Lowell M. Palmer, New York City.

Restiquoche Co., Ltd., Montreal, Que., Cullan Beatteay.

Rockland and Rockport Lime Corp., Rockland, Maine, Geo. B. Wood, W. E. Healey.

Rose Point Stone and Lime Co., New Castle, Penn., John W. Norris.

Steacy and Wilton Co., Wrightsville, Penn., R. P. Wilton, H. E. Naust.

Synthetic Nitrogen Products Co., New York City, K. E. Hothorn.

Charles Warner Co., Wilmington, Del., Charles Warner, Irving Warner, C. C. Bye, Reed C. Bye, W. R. Hazzard, R. F. Hogan.

Universal Lime and Gypsum Co., Chicago, Ill., Eugene Holland, W. G. Stromquist.

Van Sciver Corp., Philadelphia, Penn., J. L. Durnell.

Vermarco Lime Co., West Rutland, Vt., C. L. Montgomery.

Western Lime and Cement Co., Milwaukee, Wis., R. C. Brown.

Whiterock Quarries, Inc., Bellefonte, Penn., Ray C. Noll.

York Valley Lime and Stone Co., York, Penn., F. W. Cramer.

Gypsum Industries, Inc., Suspends Activities

THE GYPSUM INDUSTRIES was organized about 15 years ago. It originally was a voluntary association of gypsum producers. The membership comprised all of the important gypsum companies in the United States and Canada. In 1923 the Gypsum Industries was incorporated under the laws of the state of Illinois. The management was vested in a board of directors and offices were maintained in Chicago.

The activities of the Gypsum Industries were for the purpose of advancing or promoting the use of gypsum products by research, publicity and activities of like character; to deal with engineering and trade problems pertiment to the industry for the purpose of advancing the use of gypsum products; to carry on educational work pertinent to the industry by fellowships in schools and colleges for research; to maintain a traffic bureau to furnish traffic information to assist the industry in transportation questions before federal and state commissions and other bodies dealing with questions of transportation and with common carriers; and to maintain a credit bureau for the sole purpose of furnishing credit information.

Herschel H. Macdonald was the secretary of the Gypsum Industries for nearly its entire life. He resigned on January 21, 1928.

The engineering department was in charge of Virgil G. Marani up to the time of his death in 1925. He was succeeded by Henry J. Schwein, who also became secretary later.

The traffic department was headed by W. J. Fitzgerald.

George A. Olson, an agronomist, was in charge of the agricultural department.

All of the above activities were aggressively and successfully carried on by the Gypsum Industries. Much data and information of great value to the industry were collected and compiled in all of the several fields of activity engaged in by the organization.

Two research associates were maintained at the Bureau of Standards. The Gypsum Industries held membership in the American Society for Testing Materials, National Fire Protection Association, American Concrete Institute, Building Officials Conference of America, Pacific Coast Building Officials Conference, and similar national organizations.

Severe competitive conditions in the industry have caused the Gypsum Industries to lose the support of several of its members by resignation, thus making the financial burden for this co-operative effort too great for the remaining members to carry. At a meeting held in April it was therefore voted to suspend activities. When the present conditions are alleviated it is quite certain that the activities of the Gypsum Industries will be resumed.

Sand and Gravel Directors Mid-Year Session

Annual Convention to Be Held in Cleveland, January 9-11

THE board of directors of the National Sand and Gravel Association held the mid-year session, which has now come to be a regular institution, at the Palmer House, Chicago, May 24 and 25. Although it is the busy season for producers, the attendance was good, more than half of the directors being present. The business transacted was to fix on a time and place for the annual convention, to hear reports of committees, of the executive secretary, and of the engineering director, on the research to be undertaken by the new laboratory, and to appoint two important new committees.

The first day was occupied largely by discussion of the time and place for the next annual convention. There was an understanding before the meeting that Cleveland would be chosen, but a strong preference for New Orleans developed when the matter was put to a vote. It was finally decided to hold the convention at the Hollenden hotel in Cleveland and the dates chosen were January 9, 10 and 11, 1929. The directors expressed their appreciation of the very cordial invitation which Walter F. Jahncke, of New Orleans, La., extended to have the 1929 convention in that city. Hal C. Knight, Akron, Ohio, appeared before the directors personally to urge Cleveland as the convention city.

New Committees

Two committees which were formed from the board were chosen because of conditions that have arisen in quite recent times. One of these, of which John Prince is chairman, has to do with the relations between the cement and aggregate business. It has been charged that in some localities cement manufacturers have gone into the aggregate business and are selling aggregates at or even below cost of production to induce contractors to buy their particular brands of cement. The purpose of the committee is to look into this and see how far such a charge is true and to make recommendations if any action seems to be needed. Other members of this committee are T. E. McGrath and R. C. Fletcher. The committee will cooperate with a similar committee of the National Crushed Stone Association.

A committee on broadening the activities of the association was selected and J. C. Buckbee was chosen as chairman. Its purpose is to sell sand and gravel to the public, and make it appreciate more than it now does the importance of a commodity so basic that it enters into practically all construction. This particularly includes the desirability of creating regional offices, in charge of competent engineers, somewhat along the lines of the work done by the Portland Cement Association. Among other things it was proposed by the new committee to advertise in a medium of national circulation. This was put to a vote of the whole board and left to the executive committee with power to act. Besides Mr. Buckbee the committee consists of H. S. Davison, John Prince and F. D. Coppock.

Committees on Insurance and Car Cleaning

Judge W. W. Warwick, Washington, D. C., who is general counsel for the Commission on Employers' Liability Insurance of the United States, was at the meeting and conferred with the committee on insurance, of which J. L. Richmond is chairman. Afterward he spoke in an open meeting reviewing the unfortunate situation in which some producers using dredges find themselves when operating on navigable waters. Under the present law he said that every man who went on a dredge, a scow or even on a rowboat while at work for the company could be considered a member of a "crew" and insurance for him had to be carried on that basis. Similarly men working at landings are classified as longshoremen. This carrying of three kinds of insurance is very expensive and the cost could at least be cut to one-half if all the men were brought into one classification.

In the states of New York, Michigan and California arrangements have now been made by which the insurance on men coming under the seamen's and longshoremen's classification is paid from a state fund so that insurance for all men may be paid as state insurance. Ohio and West Virginia have not adopted this practice, but it is hoped they will do so shortly. Certain changes in the national law should be made, and he thought that there would be no difficulty in convincing congress that the present law works an injustice to the sand and gravel producers who are affected by it.

Judge Warwick was followed by Mr. Richmond, who gave some further details of how companies were affected by the present law. In his opinion Judge Warwick's estimate of the lowered cost of insurance did not go far enough. He thought that one-third of the present cost was all that would have to be paid if the men were all put into the same classification. He said that his state insurance rate for men working on the land was only 72 cents, while for men employed on the dredge special insurance had to be carried with a private company at the rate of $11.72.

J. C. Buckbee reported progress in the study of car cleaning and repairing and arrangements with the railroads to lower or obviate such costs. Questionnaires had been sent out and returns were coming in which indicated that the average cost was about 55 cents per car. One excellent result of the work had been to start many producers to study the cost of car repairing to find out what they actually expended in labor and materials. Data was expected from the membership of the National Crushed Stone Association as well as the National Sand and Gravel Association and both would be used in a summary to be presented to the railroads.

One railroad had admitted that it was changing its ideas of equipment and it was thinking of putting solid bottoms in old cars, to be used for sand and gravel shipments. A movement was on foot to have consignees clean cars and this would result, if successful, in the refusal of the railroad to accept cars that were not properly cleaned.

Mr. Buckbee felt certain that in the end the cost of cleaning and repairing cars could be cut in half, which would mean a saving of $750,000 a year to the industry.

Already producers have been impressed with what it was costing to clean and repair cars and many of them are taking it up directly with the roads over which they ship.

Engineering and Research

Stanton Walker, director of the engineering and research division of the association, reported on the work of the division and what it proposed to undertake in the near future, especially in the way of laboratory work. The bulletins issued had been well received and so great a demand had developed for Bulletin No. 1 that it had been twice reprinted. Bulletin No. 4, which had just been issued, was intended to give much the same figures but in a less technical form. The summary of sand and gravel specifications of different state highway departments had also proven itself to be very popular and a great many calls for them had come in.

Following a suggestion from J. C. Buckbee, Mr. Walker said the association was to issue these summaries in pocket notebook size and Bulletin No. 4 as well. Later other data would be published which would be issued in the notebook as well as the standard size. Covers for this data would be sold at cost price to members who wished to keep the data in this pocket form or who might wish to present it in handy reference form to engineers, architects and customers.

Some of the apparatus for the laboratory was in place, but the large testing machine had not yet been purchased. Funds were not available to carry out certain lines of research and for the present the only laboratory helpers employed were students who were able to give part time to such work. The program for research at the present time would be largely confined to a study of the effects of grading on voids. One series of tests on gravel, calling for 57

determinations of voids with different gradings, had been laid out and a similar series for sand. A third series was arranged to show the effect of different percentages of pea gravel in the usual mixes by volume. Both beams and cylinders will be broken in this series. This program had been referred to the research committee, of which Hugh Haddow is chairman, and approved.

Committee on Standard Specifications

The committee on standard specifications, Stephen Stepanian chairman, held a meeting and considered a new method of organization. To expedite matters it was proposed at first to divide the committee into six subcommittees, but it was afterward decided to have only four, as some of the committees seemed to have work that would overlap. In the final arrangement the work laid out was about as follows:

1. *Advisory Committee.* This is the usual committee to consider the work of subcommittees, make recommendations and the like.

2. *Commercial Sizes and Gradings.* This committee is to decide in the first place what sizes should be made as standard, as ¼-in. to ½-in., or ¼-in. to 1¼-in., for example. The idea is to make only those standard sizes that are really necessary and to eliminate "freak" sizes and those which are little used. Methods of defining sizes by number or otherwise are also to be considered. In discussing this it was pointed out that customers who insisted on a certain size often did not know what they really wanted. An instance was given of an architect who insisted he wanted a size from ¼-in. to ¾-in. but who refused to accept it when made, as it "wasn't much coarser than sand." What he finally decided he needed was from ¼-in. to 1¼-in.

The grading of each size is to show the tolerance for oversize and undersize and the range for intermediate sizes.

3. *Characteristics Other Than Grading and Deleterious Substances.* This committee will consider the hardness of gravel as shown by some standard test. It will also consider what amounts will be permitted of such substances as shale, "sand rock," lignite, coal, mica, organic matter and other substances that have been found to affect the strength or other characteristics of concrete. The necessity of definite information and standards was shown by the present experience of Michigan producers where the highway department is objecting to what it considers too soft materials in gravel.

4. *Committee on Tests.* In speaking of the necessity for this committee, Mr. Walker said it was a fact that we do not know how to test gravel. As an example he mentioned that results on the transverse tests of concrete made from gravel have varied from 500 to 900 lb. per sq. in., the variations being due to the method employed.

Work was especially needed on the abrasion test. Results had been shown to vary between 2% and 8% of wear, due wholly to the grading of the gravel tested. The breaking of siliceous gravels by the action of steel balls used in testing made the abrasion test unfair to such gravels. He pointed out that an abrasion test which it was attempted to standardize in Indiana could not be made on some Indiana gravels. In general, the Deval method favored the finer sizes of crushed stone over the finer sizes of gravel and the coarser sizes of gravel over the coarser sizes of crushed stone.

The committee decided to have these various sub-committees report in about two months. After discussing the ballast specification and some other matters, but without taking any action, the meeting adjourned.

The directors who attended this meeting were: R. C. Fletcher, president, Des Moines, Iowa; H. N. Battjes, Grand Rapids, Mich.; J. C. Buckbee, Chicago, Ill.; F. D. Coppock, Greenville, Ohio; H. S. Davison, Pittsburgh, Penn.; Hugh Haddow, Millville, N. J.; T. E. McGrath, Lincoln, Ill.; H. V. Owens, Utica, N. Y.; C. C. Patterson, Parkersburg, W. Va.; F. W. Peck, Kansas City, Mo.; John Prince, Kansas City, Mo.; F. W. Renwick, Chicago, Ill.; W. L. Smith, Memphis, Tenn.

Asphaltic Limestone Deposits at Margerum, Ala., To Be Developed

DEVELOPMENT of the deposits of Alabama asphaltic limestone which started six years ago at Margerum, Ala., has proved up with diamond drills a huge tonnage of bituminous limestone, comparing favorably in quality with the famous European deposits. Margerum asphaltic limestone pavements laid in numerous southern cities and on state highways have given excellent results, showing that this material has the same long life, durability and low maintenance costs that nearly 100 years of experience has taught may be expected of a bituminous limestone pavement.

Mineralogically, the deposit at Margerum is a limestone impregnated with bitumen. It occurs in a stratum from 7 to 18 ft. thick, covered with 3 to 20 ft. of overburden. The bitumen content varies from 3% to 8%. The rock is sorted in the quarries and then is mixed there and in the plant, so that the pulverized asphaltic limestone will contain uniformly from 5% to 6% of bitumen.

The production of this limestone is a fairly simple process. The rock is stripped and blasted to crusher size. It is hauled over a standard gage railroad to the crushing plant where it is reduced in the primary crusher to about four-inch maximum size. The rock is then carried to hammer mill type pulverizers which further reduce it to a size that will pass a ⅜-in. sieve, the size at which it is laid in a pavement. From the pulverizers, it goes to large storage bins, ready for shipment.

Careful attention is given during production of the limestone to controlling, within close limits, the bitumen content. This control starts with the testing of samples from closely blocked core drilling, and the plant laboratory also tests samples taken daily from the working faces of the quarries. The rock is sorted and mixed in the quarries and is further mixed during the various steps of crushing and pulverizing, assuring a uniform product. Additional precautions are taken to secure uniformity by using a storage bin that holds at least one day's production. The pulverized limestone is distributed back and forth over the length of the storage bin by a belt conveyor equipped with a traveling tripper. It is loaded into railroad cars through numerous traps in the bottom of the bin. Systematic tests are made each day on the plant production and each car is sampled and tested after it is loaded. A notice is sent out with each car, showing its bitumen content.

Margerum asphaltic limestone, as shipped ready to be mixed and laid, has the appearance of finely ground, dark colored limestone screenings. At the mixing plant there is added sufficient asphalt cement of the proper penetration for given climatic and traffic conditions. The limestone may be laid on any type of new foundations that would be satisfactory for sheet asphalt or asphaltic concrete.—J. H. Conzelman, in *Manufacturers' Record.*

New Crushed-Stone Enterprise for Western New York

A NEW $100,000 plant is to be erected in Cheektowaga, N. Y., for the production of crushed stone for the road-building purposes in that portion of western New York, with reasonable assurances that town construction work in Cheektowaga, Amherst, West Seneca, Lancaster and Clarence will support the plant at capacity production for several years.

The town board has granted the application of the recently organized Cheektowaga Crushed Stone Corp. for permission to construct a plant for the quarrying and crushing of stone on company owned lands north of Bennett road and east of Union road.

The new corporation is headed by Mark Kyler of North Tonawanda, N. Y.

Provisions in the contract between the town and company include the stipulations that no nuisances shall be created by the new industry, and that no dust shall be allowed to escape from the plant.

Building permit will be issued by the clerk as soon as the company determines style and size of the proposed plant. Estimated cost is placed at $50,000, with the same figure placed on new machinery.—*Depew* (N. Y.) *Herald.*

Portland Cement Industry Reviewed

Spring Meeting at New York City Stresses Lower Costs of Manufacture and Distribution, but Futility of Hoping to Meet Competition of Imported Cement Without Tariff Protection

FIFTY-NINE MEMBER COMPANIES of the Portland Cement Association were represented by 280 company officers at the annual spring meeting in New York City, May 21-23. A discussion of the cement import problem had considerable attention, and the following resolution was adopted:

Whereas, portland cement is on the free list of the existing tariff law, and the American portland cement industry, operating 150 mills in 32 states of the United States and representing more than $600,000,000 in invested capital, is vitally affected by increasingly serious invasion of its home markets with cement manufactured by cheap foreign labor under low standards of living and general production costs that are much smaller; and,

Whereas, The products of other important industries, likewise on the free list, are suffering similarly, both directly and indirectly, affecting general national prosperity, thereby threatening American standards of living which it is the purpose of the tariff law to maintain and creating a situation that strikingly emphasizes the need for prompt changes in the tariff structure by legislative action in congress; and,

Whereas, The national conventions of the major political parties will soon place before the electorate the platforms on which they will ask the return of their candidates in the forthcoming national elections; therefore, be it

Resolved, That the portland cement industry assembled in semi-annual meeting in New York City, May 23, 1928, regards prompt tariff revision by congress as a national need of first importance and one which should be pledged by both parties in their political platforms.

Clinker Coolers Discussed

The main theme for the cement mill sessions was clinker cooling. The symposium on coolers included papers on "Unax Coolers" by W. J. Fullerton, plant manager, and E. S. Hill, superintendent, Howe's Cave plant, North American Cement Corp.; and "Pressure Coolers" by W. M. Harbaugh, field engineer, Lehigh Portland Cement Co., Allentown, Penn. A paper on "Stores Control" was presented by R. B. Fortuin, assistant to the general manager, Pennsylvania-Dixie Cement Corp., Nazareth, Penn. F. R. McMillan, director of research, Portland Cement Association, Chicago, presented a discussion of "Factors Effecting Durability of Concrete."

The presentation of the 1927 association trophies to 10 plants which went through the year without an accident is described elsewhere in this issue.

Merle Thorpe, Banquet Speaker

Merle Thorpe, editor of the *Nation's Business*, was the only speaker on the banquet program. He reviewed the tendency to organized collective promotion by industries and the beneficial effects that result. He laid stress on the necessity for such co-operation, even to the largest corporations, as a means of combating unintelligent competition within an industry.

G. S. Brown

Association Gets Historical Relic

During the meeting W. D. Lober, president, Vulcanite Portland Cement Co., presented to the association the original circular letter which brought together representatives of 24 cement companies in a meeting in New York City during September, 1902, resulting in the organization now known as the Portland Cement Association. This circular letter was dated September 4, 1902, and was issued by B. F. Stradley, general sales agent, Vulcanite Portland Cement Co. For many years it was treasured by John B. Lober, then president of the Vulcanite company. The document is to occupy an honored place in the archives of the association.

Address of President G. S. Brown

"The six months that have elapsed since we last met have been active ones for the officers and employees of your association. Our industry continues to make records—1927 showing a new record in consumption and production of portland cement, and, while the first four months of this year have been somewhat disappointing in that consumption has been less than for the same period in 1927, there seems to me to be every indication that we shall, as a whole, probably end the year without much, if any loss, and perhaps with some small gain. Encouraging as this outlook is by comparison with many other industries, whose prospect is distinctly curtailed consumption, there is still with us the fact that we are working on a dangerously narrow profit margin.

"Profits in the industry in the United States were generally less in 1926 than in 1925, and such statements as have been published for 1927 show still smaller returns than 1926. Were it not that the industry generally had, during the last six or seven years, used earnings with lavish hand in modernizing its plants, and applied skillfully the knowledge gained through association statistics in reducing the use of coal and labor, we might be without any profits.

"In the conservation committee report a comparison is given showing the use of labor in our plants year by year for the last six years. This table shows that in this single item there has been a reduction during the six-year period of 19%. The application of the heat, formerly wasted from the kiln stacks, to the production of power through waste-heat boilers has reduced cost. Loss due to accidents has been greatly reduced as shown in the accident prevention committee's report, where in parallel columns, the accidents for the years 1925, 1926 and 1927 are shown month by month. With one exception the same month in each shows fewer accidents than in the preceding year, although in each year more mills were reporting.

Progress in Cost Reduction

"Our engineers have been active in designing methods in quarry and mill to cheapen the cost of manufacture without reducing the quality of the product—in fact, all that has been done in the way of economy has been done despite the fact that quality *as at present measured* has materially improved. We have made a start in gathering statistics in regard to selling costs and in improving the work of our salesmen. The association is providing information which will enable them, if it is used, to become salesmen for cement and its uses rather than, as they have been in many cases, mere order takers.

"Whether the cement industry has kept

pace with other industries in cost reduction, we have no accurate means of knowing. Such data as we have would indicate that, generally speaking, it has done so, although probably more attention has been paid to cost reduction by all industry in recent years than to any other factor in the profits equation. However, little has been done so far as distribution costs are concerned. While we have not succeeded as we have in manufacturing costs, nevertheless we have made a start. We can, therefore, go to the public with clean hands. We are not asking to be paid for inefficiency, incompetency, or extravagance. We must meet the competition of substituting materials with the best defense,—that of *forcing* the fight to place our own commodity in the van of construction materials. Those substitutes made in the United States under the same laws by which we are governed, using the same labor with the same wage scale, provide a spur to keep us on our toes to insure that quality shall remain high, that efficiency in production and distribution shall be maintained and that extravagance shall be eliminated.

Foreign Competition

"But how are we to meet the competition of foreign cement, manufactured under laws which are the antithesis of ours in that, instead of making illegal any agreements as to price to be charged, curtailment of production and division of territory, actually foster these practices which are banned by our law? This foreign cement is distributed under a system of freight rates, which, in effect, subsidizes exports to such a degree that freight for 3500 miles costs less than we must pay for 60 miles. Labor gets about one-fifth the wage our labor receives, forcing wife and children to labor in order that the family may have a bare subsistence. In theory, I have no quarrel with the man who would have us enable the nations of Europe to pay their war and other debts to the United States. But I would rather we provide the means, if we must provide them, through the expenditures of our well paid citizens who visit those ancient lands rather than from the wages of our American labor. For every barrel of cement imported to this country some American laborer loses over an hour's pay. This loss may be in the cement mill or quarry, the coal, mine, the gypsum mine, the cotton field or mill, the powder mill, the foundry or machine shop, the steel mill, or on our transportation systems, for all of these have a part at some stage in the manufacture and distribution of cement.

Lower Return on Invested Capital in Future

"Were this menace of imported cement removed so that our seaboard markets would give us as good a return as our interior markets, I would consider our industry satisfactory when compared with industry in general. This is excepting one or two regions where capacity to produce is very excessive. I am inclined to think that our investors must definitely accustom themselves to a lower return on invested money, particularly in those industries manufacturing a standard material such as ours. We are receiving encouragement in our campaign for a tariff on cement, but that relief is in the future. For the present we must content ourselves by putting up as strong a fight as we can in order that taxes taken from us be not used to take further work from labor. It is already suffering from curtailed opportunity to work in this country due to the importation of various materials. In some sections of the country, price of cement is already so low that manufacturers are withdrawing from seaboard markets and curtailing production rather than continue selling their product for less than it costs to make. It is very apparent to me that unless our legislators recognize the logic of these facts, we cannot expect the high wage of the present to continue. The plight of the farmer may be bad, but it will be worse if labor is unable to live on the high scale it now enjoys."

Production of Bauxite in 1927

THE production of bauxite in the United States in 1927 was 320,940 long tons, valued at $1,988,780, a decrease of 18% in both quantity and value, as compared with 1926, according to a statement prepared by J. M. Hill, of the United States Bureau of Mines, Department of Commerce.

SUPPLY OF BAUXITE IN THE UNITED STATES, 1923-1927

Year	Domestic production		Imports		Total new supply	
	Long tons	Value	Long tons	Value	Long tons	Value
1923	522,690	$3,156,610	119,020	$ 593,882	641,710	$3,750,492
1924	347,570	2,137,990	201,974	909,493	549,544	3,047,483
1925	316,540	1,988,250	353,696	1,549,120	670,236	3,537,370
1926	392,250	2,415,200	281,644	1,187,497	673,894	3,602,697
1927	320,940	1,988,780	356,580	1,572,236	677,520	3,561,016

Imported bauxite, particularly that from South America, has been of increasing importance to domestic consumers, as shown by the following table:

Exports of bauxite and bauxite concentrates have likewise increased, particularly in the last two years, since the great increase in aluminum manufacture in the Canadian and Norwegian plants of the Aluminum Co. of America.

BAUXITE (INCLUDING BAUXITE CONCENTRATES) EXPORTED FROM THE UNITED STATES, 1923-1927

Year	Long tons	Value
1923	78,560	$3,380,486
1924	77,065	3,979,832
1925	78,633	4,134,455
1926	87,770	4,741,260
1927	121,858	7,800,491

The producers of domestic bauxite reported sales during 1927 at prices ranging from $5 to $6.50 a long ton. The average for Arkansas bauxite was $6.23 a ton, for Alabama $6.08, for Georgia $5.46, and for the United States $6.20. It is believed that the values given represent more nearly production costs, as the greater part of the domestic bauxite is produced by consumers of bauxite. The prices quoted‡ for bauxite were as follows: Domestic: No. 1 chemical ore, over 60% Al_2O_3, less than 5% SiO_2 and less than 2% Fe_2O_3, $8 a long ton f.o.b. Georgia mines; foreign: Dalmatian low-silica bauxite $5 to $6.50, Istrian $5.50 to $7, and French red bauxite $6 to $7.50 a metric ton c.i.f. New York.

BAUXITE PRODUCED IN THE UNITED STATES, 1923-1927

Year	Ga., Ala.* and Tenn.		Arkansas		Total	
	Long tons	Value†	Long tons	Value†	Long tons	Value†
1923	28,810	$176,030	493,880	$2,980,580	522,690	$3,156,610
1924	19,940	156,990	327,630	1,981,000	347,570	2,137,990
1925	20,220	109,800	296,320	1,878,450	316,540	1,988,250
1926	20,680	116,650	371,570	2,298,550	392,250	2,415,200
1927	17,110	95,920	303,830	1,892,860	320,940	1,988,780

*No production from Alabama in 1924, 1925 and 1926, and no production from Tennessee in 1927.
†Value f.o.b. mines.

Production in the eastern fields in 1927 was 17,110 tons, valued at $95,920, a decrease of 17% in quantity and 18% in value, and in Arkansas it was 303,830 tons, valued at $1,892,860, a decrease of 18% in both quantity and value as compared with 1926. No bauxite was produced in Tennessee in 1927, and the Alabama production was entirely from the Eufaula district, Barbour county, which was opened in 1926.

The sales of domestic bauxite by producers to various consuming industries in

World production of bauxite has likewise been increasing along with the expansion in manufacture of aluminum, the growth of the chemical and abrasive industries, and the expanding demand for aluminous cements.

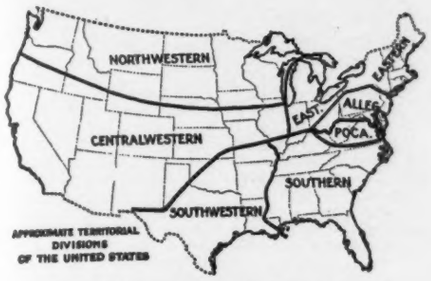
[An article elsewhere in this issue discusses the possible use of Southern bauxite for cement.]

‡Engineering and Mining Journal, Vols. 123 and 124, 1927.

DOMESTIC BAUXITE SOLD BY PRODUCERS TO INDUSTRIES IN THE UNITED STATES, 1923-1927, IN LONG TONS

Year	Aluminum	Chemical	Abrasive	Cement and refractory	Total
1923	380,520	68,870	72,830	470	522,690
1924	225,780	54,870	66,400	520	347,570
1925	173,040	67,420	73,720	260	314,440
1926	241,850	77,960	72,210	230	392,250
1927	186,490	62,410	71,790	250	320,940

Traffic and Transportation



Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week Ended May 5	Limestone Flux Week Ended May 12	Sand, Stone and Gravel Week Ended May 5	Sand, Stone and Gravel Week Ended May 12
Eastern	3,285	3,589	11,600	13,418
Allegheny	3,192	3,733	7,853	9,285
Pocahontas	474	525	931	981
Southern	630	515	12,074	11,900
Northwestern	1,442	1,525	7,855	7,143
Central western	375	391	12,819	13,102
Southwestern	366	341	6,805	7,286
Total	9,764	10,619	59,937	63,115

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

District	Limestone Flux 1927 Period to Date May14	Limestone Flux 1928 Period to Date May 12	Sand, Gravel and Stone 1927 Period to Date May 14	Sand, Gravel and Stone 1928 Period to Date May 12
Eastern	50,880	42,844	89,752	84,253
Allegheny	63,735	55,866	91,413	75,612
Pocahontas	6,366	5,763	10,957	12,519
Southern	9,535	10,219	200,711	179,591
Northwestern	22,028	16,060	75,481	61,649
Central western	8,785	7,596	128,320	133,544
Southwestern	5,555	7,524	85,762	94,466
Total	166,884	145,872	682,396	641,634

COMPARATIVE TOTAL LOADINGS, 1927 AND 1928

	1927	1928
Limestone flux	*166,884*	*145,872*
Sand, Stone, gravel	*682,396*	*641,634*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning June 3:

SOUTHERN FREIGHT ASSOCIATION DOCKET

40146. **Crushed stone and agricultural limestone,** from Valmeyer, Ill., to Memphis, Tenn., Helena, Ark., Natchez, Miss., and New Orleans, La. It is proposed to reduce the present rates on crushed stone and agricultural limestone, carloads, from Valmeyer, Ill., to the destinations mentioned to be the same as in effect from Krause, Ill. Note—Submittal No. 40146 was assigned to a proposition included in Docket 420. However, the subject was withdrawn prior to distribution of the submittal to the membership, and the number is therefore assigned to this proposition.

40203. **Limestone, ground and pulverized,** from, to and between stations on the A. C. L. R. R. It is proposed to revise rates on ground and pulverized limestone, carloads, minimum weight 60,000 lb., from, to and between points on the A. C. L. R. R., located on and north of the Jacksonville-River Junction line of the S. A. L. Ry. on basis of mileage scale, the following being representative of the suggested scales:

Rates in cents per ton of 2000 lb.

Miles	Single	Joint	Miles	Single	Joint
5	60	90	450	260	280
20	70	100	500	280	300
50	100	130	550	300	320
70	110	140	600	320	340
100	120	150	650	340	360
150	140	170	700	360	380
200	160	190	750	380	400
250	180	210	800	410	420
300	200	230	850	420	440
350	220	240	900	440	460
400	240	260	1000	480	500

40235. **Limestone,** from Calera, Ala., to Miss. Central R. R. stations. Combination basis now applies, and it is proposed to establish through commodity rates on **limestone, ground or pulverized,** carloads, from Calera, Ala., to all stations on the Miss. Central R. R., based on the proposed Georgia Trunk Line scale, less 10%, and to which will be added 25c per net ton relief when destined to local stations on the M. C. R. R., which is the same relief as was accorded the M. C. R. R. in I. C. C. Docket 17517.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

40003. **Lime,** from Knoxville, Tenn., Group to Kingsport, Tenn. Present rate, 195c. Proposed rate on **lime,** in bulk or in sacks, carloads, minimum weight 66,000 lb., from Concord, Knoxville, Luttrell, Marble City, River Front Extension and South Knoxville Extension, Tenn., to Kingsport, Tenn., 192c per net ton, same as rate to Canton, N. C.

40091. **Stone** or **slate, crushed,** from Bolivar, Fairmount, Ga., and Tellico Plains, Tenn., to South Bend and Logansport, Ind. It is proposed to establish the following reduced rates on **stone** or **slate, crushed,** carloads (See Note 3), to South Bend and Logansport, Ind.: From Bolivar and Fairmount, Ga., 423c; from Tellico Plains, Tenn., 405c per net ton. Same as current rates to Chicago, Ill.

40102. **Lime** from southern lime kilns to Louisiana destinations. Combination rates now apply. Proposed rates on **lime,** carloads, minimum weight 30,000 lb., from Chisca, Denie, Ala., Evensville, Tenn., Ft. Wayne, Ala., Marble City, Tenn., River Front Extension and South Knoxville Extension, Tenn., to Alexandria, Monroe, Shreveport, Advance and Hodge, La., 470c per net ton.

40120. **Gravel** from East St. Louis, Ill., to New Orleans, La. Class rate of 57c now applies. Proposed rate on **gravel,** carloads (See Note 3), from East St. Louis (applicable only from I. C. R. R. tracks in East St. Louis) to New Orleans, La., 267c per net ton, this being same rate as proposed from East St. Louis on crushed stone under general revision in sand, gravel and crushed stone rates to Mississippi Valley points.

40128. **Ground limestone,** from Cartersville, Ga., and Sparta, Tenn., to Virginia cities. It is proposed to establish commodity rates on calcite, ground (ground limestone), carloads, minimum weight 60,000 lb., the present proposed rates (in cents per net ton) being:

From Cartersville, Ga.

To	Pres.	Prop.	To	Pres.	Prop.
Roanoke	(*)	261	Suffolk	314	288
Lynchburg	269	261	Portsmouth	314	297
Petersburg	(*)	279	Norfolk	314	297
Richmond	278	279			

From Sparta, Tenn.

To	Pres.	Prop.	To	Pres.	Prop.
Roanoke	(*)	270	Suffolk	450	324
Lynchburg	423	279	Portsmouth	450	324
Petersburg	(*)	306	Norfolk	450	324
Richmond	441	306			

Suggested rates are made on the general basis for rates from the origins in question to southern points.

*No through commodity rates in effect and class rates is restricted so as not to apply.

39852. **Ground and pulverized limestone,** from C. & O. Ry. producing points to V. & C. S. R. R. stations. Lowest combination rates now apply, and it is proposed to establish through rates on—

Ground and pulverized limestone and ground and pulverized marl, carloads, minimum weight 60,000 lb., from C. & O. Ry. producing points, viz.: Barber, Eagle, Mountain, Indian Rock and Rocky Point, Va., to stations on the Virginia and Carolina So. R. R., made on basis of scale recently used in establishing rates from N. & W. Ry. producing points to these destinations. Statement of the proposed rates will be furnished upon request.

SOUTHWESTERN FREIGHT BUREAU DOCKET

14797. **Sand, gravel, crushed stone, etc.,** from points in Missouri and Arkansas to Memphis, Tenn. To revise rates on sand, gravel, crushed stone, rubble stone, broken stone, slag and chert, carloads (See Note 3), from points in Missouri and Arkansas to Memphis, Tenn., and other Mississippi river crossings, so that they will be no lower than the scale prescribed in I. C. C. Docket 17517. It is presumed to revise rates on sand, gravel, crushed stone, etc., from and to points shown above, so that they will be no lower than the scale prescribed in I. C. C. Docket 17517.

14932. **Crushed stone,** from points in Georgia to Mineral Wells, Tex. To establish a rate of $5.65 per ton of 2000 lb. on **crushed stone,** carloads, from Tate and Whitestone, Ga., to Mineral Wells, Tex. The above rate, it is stated, is based on the Vicksburg-Shreveport combination.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

14630. **Sand, common, run of bank,** carloads (See Note 2), from Lenoxdale, Mass., to Wingdale, N. Y., $1.60 per net ton, via Brewster, N. Y., and N. Y. C. R. R. Reason—To provide joint rate comparable with present rate on crushed stone from New Britain, Conn., etc.

14530. **Sand,** building, common or run of bank, carloads, and **gravel,** screened, not less than ½-in. in diameter, carloads, these commodities to be shipped in bulk in open cars, from Greenbush, Mass., to Fall River, Mass., and Newport, R. I. Sand to Fall River, 75c per net ton; to Newport, 85c per net ton; gravel, to Fall River, 90c per net ton; to Newport, $1 per net ton. Reason—Proposed rates are necessary to permit the traffic to move by rail against local sand and gravel competition.

14580. **Stone, broken** or **crushed,** and in bulk or in other open top cars; amiesite, carloads (See Note 1), from Rocky Hill, Conn., to N. Y. C. R. R., Hudson Division, stations, viz.: 130th Street, Yonkers to Irvington, N. Y., Tarrytown to Montrose, N. Y., Peekskill to Hyde Park, N. Y., Staasburg, Barrytown, Tivoli to Linlithgo, N. Y., Greendale to Stuyvesant, N. Y., Schodack Landing and Castleton, N. Y., rates on crushed stone based 20c per ton over single line haul rate for equal distances, while rates on amiesite are 10c over the proposed crushed stone rates. Reason—To provide rates from a new quarry comparable with those now in effect from New Britain, Conn.

14602. **Sea** or **shore sand,** carloads (See Note 3), to Dexter, Me., from Old Orchard, Me., 13½c; from Boston, Mass., 16½c. Reason—Same basis as now published for other joint hauls within New England.

14610. **Gravel** and **common sand,** carloads (See Note 3), from Scarboro Beach, Me., to Bethel, Vt., $1.75 per net ton; to Middlesex, Vt., $1.85 per net ton. Reason—To establish commodity rates comparable with those now effective for similar distances.

WESTERN TRUNK LINE DOCKET

2292F. **Stone, crushed,** carloads (See Note 3), but in no case shall the minimum weight be less than 40,000 lb., from Randville, Mich., to Sandstone, Minn. Present, $3.40 per net ton; proposed, $2.50 per net ton.

3845C. **Stone,** viz.: **Crushed, broken, chatts, crushed granite, rip rap, screenings and stone dust,** carloads, from Osage, Iowa, to Minneapolis and St. Paul, Minn. Present, Class E, 14c; proposed, $1.40 per net ton (See Note 1).

1376X. **Sand, silica, pumice, ash, volcanic,** carloads, from Buffalo Park, Kan., to Chicago, St. Louis, Missouri River and related groups. Present, class rates; proposed, same as in effect from Quinter, Kan., as outlined in report of meeting held in Chairman Boyd's office on March 15, in connection with W. T. L. Dockets 1376-O, 1376-Q, and 1376-U.

6453-A. **Stone, crushed,** carloads (See Note 3), but in no case less than 40,000 lb., from Mill Grove, Mo., to stations on the C. R. I. & P. Ry.

in Iowa within a distance of 160 miles. Rates in cents per net ton:

	Pres.	Prop.		Pres.	Prop.
45 miles	130	74	90 miles	170	110
50 miles	130	79	100 miles	180	120
55 miles	140	84	115 miles	200	130
60 miles	140	88	130 miles	210	140
65 miles	140	91	145 miles	220	140
70 miles	140	94	160 miles	220	150
80 miles	160	100			

794B. Rates. **Sand and gravel**, carloads (See Note 3). In no case shall the minimum weight be less than 40,000 lb., from Winona, Minn., to stations in Iowa. Present—Various rates. Proposed—Distance scale authorized from Mason City to Minnesota points. For example:

From Winona, Minn.

To—	Distance	Present rate	Rate under proposed scale
New Albin, Iowa	48.7	100	90
Lansing, Iowa	60.1	110	95
Harper's Ferry, Iowa	75.3	110	110
Waukon Jct., Iowa	80.7	140	120
Beulah, Iowa	96.4	140	130
Decorah, Iowa	141.6	170	150
Cresco, Iowa	148	160	150

5817A. Rate. **Stone, crushed**, carloads (See Note 3), but not less than 40,000 lb., from Atchison, Kan., to St. Joseph, Mo. Present—4c per 100 lb. Proposed—3½c per 100 lb.

6149A. Rates. **Sand and gravel**, carloads, usual minimum weights, from Hartland, Wis.

To—	Present	Proposed
Kenosha, Wis.	*	85
Waukegan, Ill.	*	85
Highland Park, Ill.	*	85
Niles Center, Ill.	*	75
Mundelein, Ill.	*	75

*Combination basis.

6216. Rates. **Limestone, agricultural** (for soil treatment), in bags, barrels, boxes or bulk, minimum weight 60,000 lb., from Dubuque, Iowa, to Wisconsin points.

To—	In cents per net ton. Pres. rate	Prop. rate
Potosi	80	63
McCartney	80	63
Cassville	100	65
Glenhaven	110	70
Bagley	130	70
Wyalusing	130	80
Prairie du Chien	140	90

TRUNK LINE ASSOCIATION DOCKET

18674. **Crushed stone**, carloads (See Note 2), from Blakeslee, N. Y., to Chittenango, N. Y., 83c per ton of 2000 lb. Reason—Proposed rate is comparable with rates now in force from Jamesville, N. Y., to Chittenango, N. Y., and from N. LeRoy, N. Y., to Lincoln Park, N. Y.

18675. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, also **gravel**, carloads (See Note 2), from Patapsco, Md., to Harman, Md., 60c per ton of 2000 lb. Reason—Proposed rate compares favorably with rates from Dorsey, Md., to Relay and St. Davis, Md., from Severn, Md., to Claremont Stock Yards, Md., and from Stony Run, Md., to Harman, Md.

18676. **Sand** (other than blast, engine, foundry, molding, glass, silica, quartz or silex), carloads (See Note 2), from Oaks Corners, N. Y., to Levanna, N. Y., 83c per ton of 2000 lb. Reason—Proposed rate is same as now at present in effect on crushed stone between same points. Also compares favorably with rates from Maxwells, N. Y., to Geneva, N. Y., and from N. Fair Haven, N. Y., to Locke, N. Y.

17941, Sup. 3. **Limestone** (except ground, precipitated or pulverized and limestone dust), carloads (See Note 2), from Ogdensburg, N. J., to Marlton and Sewell, N. J., $2.34, and Salem and Woodstown, N. J., $2.56 per ton or 2000 lb.

18704. **Sand and gravel**, carloads (See Note 2), from Maxwells and Wadsworth, N. Y., to Warsaw, N. Y., $1 per ton of 2000 lb. Reason—Proposed rates are comparable with rates from Maxwells, N. Y., to Canandauqua and Mertensia, N. Y., and from Machias, N. Y., to Warsaw, N. Y.

18705. **Crushed stone**, carloads (See Note 2), from Beavertown, Penn., to Glen Iron, Penn., $1.15 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates now in force from Dalmatia, Penn., to Coburn and Paddy Mountain, Penn.

18710. **Lime, agricultural**, land, chemical, gas or glass, carloads, minimum weight 30,000 lb., also ground limestone, carloads, minimum weight 50,000 lb., from Shraders, Penn., to Lewistown, Penn., 5c per 100 lb. Reason—Proposed rate is comparable with rates from Bellefonte, Penn., to Howard and Lock Haven, Penn., and from Devault, Penn., to Conshohocken and Betzwood, Penn.

18732. **Crushed stone**, carloads (See Note 2), from Tomkins Cove, Jones Point and Marlboro, N. Y., to N. Y. O. & W. Ry. stations, Firthcliffe, Little Britain, Middletown, Campbell Hall, High Falls, Fallsburgh, Liberty, N. Y., and various rates ranging from $1.10 to $1.50 per ton of 2000 lb. Reason—Proposed rates are comparable with rates from West Nyack, N. Y., and Otisville, N. Y.

18861. **Sand and gravel** (other than molding, foundry, etc.), carloads (See Note 2), from Maxwells, N. Y., and Wadsworth, N. Y., to P. & L. Jct. to Greigsville, N. Y., incl., 80c per ton of 2000 lb. Reason—Proposed rate is comparable with rate from Canawaugus, N. Y., to Caledonia and Greigsville, N. Y.

18866. **Agricultural, land, chemical, glass or gas lime**, carloads, minimum weight 30,000 lb., also **ground limestone**, carloads, minimum weight 50,000 lb., from Stover, Penn., to Pennsylvania points.

To—	Prop. rate	To—	Prop. rate
Boardman	11	Curry Run	11
Carnwath	11½	Bell Run	11
Glen Hope	11½	Lumber	11½
Mitchells	11	Bower	11
Glen Richey	11	Gipsey	11½
Olanta	11	Wilgus	11½
New Millport	11	Arcadia	11½
Kermoor	11		

Rates in cents per 100 lb.

Reason—Proposed rates are fairly comparable with rates now in force from Bellefonte, Penn.

18869. **Gravel and sand**, N. O. I. B. N. in O. C., except blast, engine, foundry, glass, molding, quartz, silex and silica, carloads (See Note 2), from Kenvil and Succasunna, N. J., to Danielsville and Berlinsville, N. J., $1.10 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates on like commodities for like distances, services and conditions.

18870. **Marble dust, chips and waste, also marble, crushed, broken and rubble**, carloads, minimum weight 50,000 lb., from Tuckahoe, Pleasantville, Patterson and Wingdale, N. Y., to Vineland, N. J., 19½c per 100 lb. Reason—Proposed rates are comparable with rates from Pleasantville and Wingdale, N. Y., to Williamstown Junction, N. J.

18874. **Crushed stone**, carloads (See Note 2), from Steelton, Penn., to Lewisburg, Penn., $1.35 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates from Steelton, Penn., to Watsontown, Penn., and from Shamokin, Penn., to Nanticoke, Wilkes-Barre and Rising Springs, Penn.

18088, Sup. 2. **Sand, viz., glass, engine, molding, silica, ground flint, quartz or silex**, carloads (See Note 2), from Hancock-Round Top District to Hazlehurst, Penn., $2.60 per ton of 2000 lb.

18883. **Sand**, other than blast, engine, glass, molding, foundry, silica, silex or quartz **and gravel**, carloads (See Note 2), from Machias, N. Y., to Athol Springs, Lake View, Derby, Angola, Farnham, Irving, Silver Creek, N. Y., 91c; Waites Crossing, Dunkirk, Van Buren, N. Y., $1, and Forsyth, Ripley and State Line, N. Y., $1.10 per ton of 2000 lb. Reason—Proposed rates are same as at present in effect from Silver Springs, Attica, Clarence, N. Y.

18885. **Sand**, other than blast, engine, foundry, glass, molding or silica, **and gravel**, carloads (See Note 2), from Tioga, Penn., to Tiolga Jct., Mitchell, Mill Creek, Lambs Creek, Mansfield, Canoe Camp, Covington, Blossburg, Penn., $1.10 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates from Tioga, Penn., to Elmira, Lowman, Wilawana, N. Y., and from Alfred, N. Y., to Bath, Penn.

18904. **Limestone, ground, precipitated or pulverized and limestone dust**, carloads, minimum weight 50,000 lb., from Atlas, Hamburg and Lime Crest, N. J., to Andover, Beverly, Chelsea, Chicopee Falls, Mass., Lowell and Reading, Mass., 19½c per 100 lb. Reason—Proposed rates are comparable with rates to Greenfield, Lawrence, Ipswich and Woburn, Mass., and Manchester, N. H.

18907. **Crushed stone**, carloads (See Note 2), from Green Lane, Penn., to Philadelphia, Penn., $1.15 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates now in force from Green Lane, Penn., to 58th St. (Phidalephia), Penn., and Darby, Penn., and from Rock Hill, Penn., to Darby, Penn.

4211, Sub. 3. **Stone**, carloads, from Falling Springs, Ill., to all stations in Illinois on the Mo. Pac. R. R.:

To (representative points)	Present A	Proposed A	Proposed B
Fountain, Ill.	86	80	70
Howardton, Ill.	230	90	80
Cairo, Ill.	250	100	100
Johnston City, Ill.	86	95	95

Column "A." **Stone, viz.: Stone, ground or pulverized (in bulk), crushed or rough quarried**, in straight or mixed carloads (See Note 3), but not less than 40,000 lb.

Column "B." **Agricultural screenings or dust** (fertilizer limestone), ground sufficiently fine so as to be suitable for acid soil treatment, carloads (See Note 3), but not less than 60,000 lb.

4465. **Gravel, unwashed** (See Note 1), from Moronts, Ill., to I. C. R. R. points in Illinois viz.:

	Pres.	Prop.		Pres.	Prop.
Winona	$1.01	$0.80	Kappa	1.01	.90
Rutland	1.01	.85	Hudson	1.01	.90
Minonk	1.01	.85	Kerrick	1.01	.90
Woodford	1.01	.88	Normal	1.01	.90
Panola	1.01	.88	Bloomington	1.01	.90
El Paso	1.01	.88			

4480. **Sand and gravel**, carloads, from Keokuk, Iowa, to Wabash Ry. stations in Illinois.

To—	Present	Proposed
Golden	88	82
Blacks	88	82
Camp Point	88	82
Clayton	88	82
Timewell	88	82
Mt. Sterling	88	82
Hersman	*88 †101	82
Gilbirds	*88 †101	82
Versailles	*88 †101	82
Perry Springs	*88 †101	82
Meredosia	*88 †101	82

*Sand. †Gravel.

3718D. **Sand and gravel**, carloads, from Lincoln, Ill., to C. S. & St. L. Ry. stations.

To—	Pres.	Prop.	To—	Pres.	Prop.
Waverly	None	70	Jerseyville	None	76
Hagarman	None	76	Lockhaven	None	76
Medora	None	76			

4493. **Lime rock or lime stone, broken, crushed or ground**, carloads, from Mosher, Mo., to Tamms, Ill. Present, 16c per 100 lb.; proposed, $1.50 per ton of 2000 lb.

4498. **Stone, viz., stone, ground or pulverized, crushed or rough quarried**, in straight or mixed carloads (See Note 3), but not less than 40,000 lb. It is proposed that this commodity be packed in bags and shipped under rates applicable on stone when moving in bulk, from Illinois stone quarries to all points in I. F. A. territory.

18800. **Sand**, other than blast, engine, etc., carloads (See Note 1), from Pier 50, Shackamaxon St. (Philadelphia) Penn., to North Penn Junction, Penn., 50c per ton of 2000 lb. Reason—Proposed rate is the same as that in effect between other Philadelphia, Penn., stations.

18801. **Stone, crushed** (other than bituminous asphalt rock), N. O. I. B. N. in O. C., carloads (See Note 2).

To—	From— LeRoy, N. Y. Prop. rate	From— Akron, N. Y. Prop. rate
Churchville, N. Y.	75	75
Chili, N. Y.	75	75
Bergen, N. Y.	75	....
West Bergen, N. Y.	75	....
East Bergen, N. Y.	....	75

Rates in cents per ton of 2000 lb.

Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

18802. **Stone, crushed** or broken, and **stone screenings** carloads (See Note 2), from Glyndon, Md., to stations on the W. Md. Ry., Glen Morris, Edgemont, Hagerstown, Frederick, Md., Black Rock, York, Charmian, Fairfield, Penn., and various, rates ranging from $0.70 to $1.05 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force on like commodities from and to points in the same general territory.

18809. **Crushed stone**, carloads (See Note 2), from Ashcom, Penn., to Claysburg, Penn., 80c per ton of 2000 lb. Reason—Proposed rate is fairly comparable with rate on slag from Johnstown, Penn., to Claysburg, Penn.

18813. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville and Tullytown, Penn., to Plymouth Meeting, Penn., 90c per ton of 2000 lb. Reason—Proposed rates are fairly comparable with rates to Merion, Ardmore, Rosemont, Bryn Mawr, Penn.; also compare favorably with rates from Philadelphia, Penn., to Plymouth Meeting, Penn.

18815. **Agricultural lime**, carloads, minimum weight 30,000 lb., from Spahr, Md., to P. R. R. stations to which rates are now published on agricultural lime, from Frederick, Md., as per P. R. R. G. O.-I. C. C. 14567, rates based 30c per net ton over P. R. R. Frederick rate. Reason—To place Spahr, Md., on a comparable basis with Frederick, Md.

18816. **Gravel and sand**, other than blast, engine, foundry, glass, molding, silica and fire, carloads (See Note 2), from Attica, N. Y., to Chili, N. Y., 75c per ton of 2000 lb. Reason—To place the rates from Attica, N. Y., on a comparable basis with existing rates from Wadsworth and Maxwells, N. Y.

18835. **Stone, natural** (other than bituminous asphalt rock), crushed, carloads (See Note 2), from Bethlehem, Penn., to Allentown, Penn., 50c per ton of 2000 lb.

18836. **Sand**, blast, core, engine, fire, foundry, glass, molding, quartz, silex or silica, carloads (See Note 2), from Titusville, Penn., to Erie, Penn., 99c per ton of 2000 lb. Reason—Proposed rates compare favorably with existing rates from Starbrick, Penn., to Erie, Penn., and from Erie, Penn., to Titusville and Warren, Penn.

18837. **Sand**, blast, core, engine, foundry, glass, molding, quartz, silex or silica, carloads (See Note 2), from Titusville, Penn., to Pittsburgh, Homestead, Duquesne, East Pittsburgh, McKeesport and Clairton, Penn., $1.80 per ton of 2000 lb. Reason—Proposed rates compare favorably with existing rates from Daguscahonda, Garovi and Oil City, Penn.

18617, Sup. 1. **Crude or crushed fluxing limestone**, carloads (See Note 2), from Bakerton, Engle, Kearneysville and Martinsburg, W. Va., to

Bayonne and Perth Amboy, N. J., $2.90 per ton of 2240 lb., and from Millville, W. Va., Capon Road, Stephens City, Strasburg and Strasburg Junction, Va., to Bayonne, N. J., $3.05 per ton of 2240 lb.

CENTRAL FREIGHT ASSOCIATION DOCKET

18501. To establish on **crushed stone**, carloads, Greencastle, Ind. (B. & O. R. R.), rate of $1.20 per net ton. Present rate: $1.26 per net ton.

18502. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Kanauga, W. Va., and Pomeroy, Ohio, to Elkview, W. Va., rate of 110c per net ton. Present rates: From Kanauga, 115c per net ton and from Pomeroy, 125c per net ton.

18503. To establish on **gravel and sand**, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, Richmond, Ind., to Briant, Ind. Rate of 75c per net ton. Present rate: 88c per net ton.

18516. To establish on **crushed stone** and screenings, carloads, Hillsville and Walford, Penn., to Ohio, rates as shown in Exhibit A, attached. Present rates: As shown in Exhibit A, attached.

Present and Proposed Rates on Crushed Stone and Screenings, Carloads, From Hillsville and Walford, Penn., District

To—	Proposed rate, cts. per net ton	Present rate, cts. per net ton	Short line distance
Cleveland, Ohio	80	90	78
Akron, Ohio	80	90	63
Barberton, Ohio	80	90	70
Canton, Ohio	80	90	65
Orriville, Ohio	80	90	88
Rittman, Ohio	90	105	83
Sterling, Ohio	90	105	86
Creston, Ohio	90	105	89
Lodi, Ohio	90	105	96
Seville, Ohio	90	105	89
Chippewa Lake, Ohio	90	105	94
Medina, Ohio	90	105	85
Valley City, Ohio	90	105	95
Strongville, Ohio	90	105	93
Berea, Ohio	90	105	86
Lester, Ohio	90	105	90
Erhart, Ohio	90	105	92
Grafton, Ohio	90	105	102
Elyria, Ohio	90	105	101
Lorain, Ohio	90	105	104
Wadsworth, Ohio	90	105	78
Burbank, Ohio	90	.....	94
Wooster, Ohio	90	.....	99
Holmesville, Ohio	90	.....	112
Millersburg, Ohio	90	.....	111
Wellington, Ohio	90	.....	108
Bakers, Ohio	90	.....	108
Nova, Ohio	90	.....	112
Ashland, Ohio	90	175	115
Baltic, Ohio	90	.....	106
Dover, Ohio	90	.....	86
New Philadelphia, Ohio	90	.....	89
Uhrichsville, Ohio	90	.....	98
Coshocton, Ohio	110	.....	124
New Comerstown, Ohio	100	150	105
Cambridge, Ohio	120	150	131
Lore City, Ohio	120	150	135
Neffs, Ohio	115	140	100

Tariff authority, P. & L. E. R. R. I. C. C. No. 2866.

From—	Pres. rate	Miles	Pres. Prop. rate	rate	*Miles
From Hillsville-Walford District					
To Cleveland, Ohio					
Narlo, O.	80	85	90	80	78
Martin, O.	80	95	90	80	78
Woodville, O.	80	103	90	80	78
To Akron, Ohio					
Sandusky, O.	80	94	90	80	63
Narlo, O.	80	100	90	80	63
Carey, O.	80	107	90	80	63
Arlington, O.	80	122	90	80	63
Dunkirk, O.	80	129	90	80	63
To Barberton, Ohio					
Bellevue, O.	80	74	90	80	70
Marion, O.	80	96	90	80	70
Carey, O.	80	116	90	80	70
Dunkirk, O.	80	122	90	80	70
Arlington, O.	80	129	90	80	70
To Orrville, Ohio					
Marion, O.	80	88	90	80	88
Dunkirk, O.	80	113	90	80	88
To Rittman, Ohio					
Marblehead, O.	90	82	105	90	81
Narlo, O.	90	103	105	90	81
Kenton, O.	90	110	105	90	81
To Sterling, Ohio					
North Baltimore, O.	90	100	105	90	84
Kenton, O.	90	107	105	90	84
To Seville, Ohio					
Narlo, O.	90	96	105	90	90
Arlington, O.	90	101	105	90	90
North Baltimore, O.	90	103	105	90	90
To Creston, Ohio					
North Baltimore, O.	90	97	105	90	87
Kenton, O.	90	104	105	90	87
To Chippewa Lake, Ohio					
North Baltimore, O.	90	108	105	90	95
To Medina, Ohio					
McVittys, O.	90	101	105	90	99
Bluffton, O.	90	113	105	90	99
North Baltimore, O.	90	120	105	90	99
To Valley City, Ohio					
North Baltimore, O.	90	123	105	90	102
To Strongsville, Ohio					
Narlo, O.	90	93	105	90	96
North Baltimore, O.	90	127	105	90	96
To Berea, Ohio					
Marion, O.	90	89	105	90	87
Owens, O.	90	92	105	90	89
North Baltimore, O.	90	131	105	90	89
To Lester, Ohio					
North Baltimore, O.	90	117	105	90	107
To Erhart, Ohio					
North Baltimore, O.	90	119	105	90	109
To Grafton, Ohio					
Kenton, O.	90	100	105	90	103
North Baltimore, O.	90	126	105	90	103
To Elyria, Ohio					
Arlington, O.	90	122	105	90	102
North Baltimore, O.	90	134	105	90	102
To Lorain, Ohio					
Bluffton, O.	90	101	105	90	104
To Wadsworth, O.					
Sandusky, O.	80	77	105	90	78
Marion, O.	80	90	105	90	78
Kenton, O.	90	115	105	90	78
To Burbank, Ohio					
Kenton, O.	90	98	.....	90	94
To Wooster, Ohio					
Marblehead, O.	90	105	.....	90	99
Marble Cliff, O.	90	107	.....	90	99
North Baltimore, O.	90	107	.....	90	99
To Millersburg, Ohio					
Sandusky, O.	90	105	.....	90	111
To Wellington, Ohio					
Enon, O.	90	136	.....	90	108
To Bakers, Ohio					
Delphos, O.	90	117	.....	90	108
To Baltic, Ohio					
Sandusky, O.	100	116	.....	90	106
Marblehead, O.	100	135	.....	90	106
To Dover, Ohio					
Marble Cliff, O.	100	106	.....	90	89
To New Philadelphia, Ohio					
Marble Cliff, O.	100	109	.....	90	91
To Uhrichsville, Ohio					
Marble Cliff, O.	100	103	.....	90	101
To Coshocton, Ohio					
Dunkirk, O.	90	126	.....	110	124
Marblehead, O.	100	140	.....	110	124
Martin, O.	110	150	.....	110	124
To New Comerstown, Ohio					
Marblehead, O.	130	155	150	100	108
To Cambridge, Ohio					
Bellevue, O.	140	151	150	120	134
To Neffs, Ohio					
Marblehead, O.	150	187	140	115	102

*Mileages are from Hillsville, Penn.; the distance from Walford is three miles greater.

18548. To establish following rates on **crushed stone**, carloads, from West Columbus, Ohio, to Ohio (in cents per net ton):

To—	Proposed	To—	Proposed
Jackson	90	Keystone	120
to		to	
Black Fork	120	Slocums	135
Roman	125	Sciotoville	115
Fire Brick	125	Portsmouth	105
Eifort	135		

Present—Sixth class basis.

18529. To amend Item 1202 of C. F. A. T. B. Tariff 130R, naming 60% of sixth class rating on **agricultural lime** or **agricultural marl**, carloads, minimum weight 50,000 lb., Bedford and Mitchell, Ind., to stations in Illinois, including points in Indiana located in the Chicago switching district, in the following manner:

(a) To include Putnamville, Ind., as an origin point.

(b) To provide that the 60% of sixth class basis will also apply to all destinations in Indiana.

18505. Proposition: To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Lake Ciecott, Ind., to Indiana, following rates per net ton:

To— Erie R. R. Stations	Proposed	Present
Crown Point	$1.05	$1.07
Winfield	1.00	1.07
Boone Grove	.95	1.07
Clanicarde	.90	1.04
Monterey	.85	1.07
Leiters	.80	1.07
Rochester	.85	1.07
Akron	.90	1.07
Disko	.90	1.07
Servia	.85	1.07
Clear Creek	.90	1.07
Huntington	.95	1.07

18506. To establish on **sand** and **gravel**, carloads, Columbus, Ohio, to Thorpe and Springfield, Ohio, rate of 80c per per net ton. Present rate: 12c.

18507. To establish on **sand** (except **blast**, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Hubbard, Ind., to points in Indiana, rates as shown below per net ton:

Destination—	Proposed	Present
Delong	$ .65	$1.70
Bruce Lake	.65	1.80
Kewanna	.65	1.90
Lucerne	.75	2.10
Verona	.75	2.30
Logansport	.75	2.30
Adamsboro	.80	2.30
Hoover	.80	2.30
Mexico	.80	2.30
Denver	.85	2.30
Chili	.85	2.40
Pettysville	.85	2.40
Roann	.90	2.40
Laketon	.90	2.40
Newton	.90	2.40
North Manchester	.90	2.30
Liberty Mills	.90	2.40
Collins	.85	2.70
Churubusco	.90	2.70
Ari	.90	2.70
La Otto	.95	2.70
Cedar	.95	2.80
Auburn Junction	.95	2.80
Auburn	.95	3.00
Moore	1.00	3.00
Butler	1.00	3.00
Inwood	.65	1.90
Bourbon	.65	1.90
Etna Green	.65	2.30
Atwood	.65	2.30
Warsaw	.70	2.30
Pierceton	.75	2.60
Larwill	.80	2.60
Columbia City	.80	2.60
Coesse	.80	2.70
Arcola	.85	2.70
Fort Wayne	.90	2.70

18508. To establish on **sand** and **gravel**, lake, river or bank, carloads, Kalamazoo, Mich. (Country Spur), to Mishawaka, Ind., rate of 85c per net ton. Present rate: None in effect.

18509. To establish on **crushed stone**, carloads, East Liberty, Ohio, to Blessings, Ohio, rate of 105c per net ton. Route: Via N. Y. C. R. R. Slater, O.-D. T. & I. R. R. Present rate: sixth class.

18510. To establish on **crushed stone**, carloads, Maple Grove, Ohio, to points in Ohio, rates as shown below per net ton:

Destination—	Proposed	Present
Cambridge	$1.35	$1.60
Kimbolton	1.25	1.60
Newcomerstown	1.25	1.40
Port Washington	1.25	*3.40
Uhrichsville	1.25	*3.40

*Sixth class.

18559. To establish a rate of $1.76 per net ton on **blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica sand**, carloads, Zanesville, Ohio, to Parkersburg, W. Va. Present rate, $1.39 per net ton.

18562. To establish on **sand and gravel**, carloads, Dundee, Ind., to Ferguson, Yoder and Ossian, Ind., rate of 90c per net ton. Present rate—Sixth class. Route—Via N. Y. C. & St. L. R. R. direct.

18572. To establish on **crushed stone**, carloads, from Cleveland, Ohio, to Strongville and Brecksville, Ohio, rates as shown below:

To—	In cents per 2000 lb. Prop. rate	Pres. rate
Strongville, Ohio	60	70
Brecksville, Ohio	60	80

18575. To establish on **sand and gravel**, carloads, from Akron, Ohio, to Kinsman, Ohio, rate of 100c per net ton. Present rate, 120c per net ton.

18586. To establish on **sand and gravel**, carloads, Lafayette, Ind., to Webster and Eastburn, Ill., rate of 80c per net ton. Present rate, 88c per net ton.

18504. To establish on **lime**, carloads, minimum weight 380,000 lb., Gibsonburg and Woodville, Ohio, to destinations in Virginia on the Southern railway, Washington division, listed below:

Seminary, Springfield, Vulcan, Ravenswood, Burke, Sideburn, Fairfax, Clifton, Manassas, Manassas Junction, Bristow, Nokesville, Catlett, Calverton, Casanova (Warrenton), Meetze, Warrenton (branch), Midland, Bealeton, Remington, Elkwood, Brandy, Inlet, Culpeper, Winston, Mitchell, Buena, Rapidan, Montpelier, Somerset, Barboursville, Burnleys, Gilbert, Watts, Proffit, Rio, Hickory Hill, Arrowhead, Red Hill, North Garden, Applegate, Covesville, Hamner, Faber, Rockfish, Elma, Shipman, Oak Ridge, Arrington, Tye River, New Glasgow, Amherst, Sweet Briar, Coolwell, McIvor, Monroe, Winesap, Rivermont, Rixlew, Wellington, Gainesville, Haymarket, Thoroughfare, Beverly Mills, Broad Run, The Plains, Belvoir, Marshall, Rectortown, Delaplane, Markham, Belle Meade, Linden, Applewood, Warthen Siding, Happy Creek, Front Royal, Riverton, Junction, Riverton, Buckton, Water Lick, Valcour, Strasburg Yard, Keller's Siding, Turkey Knob, Shenandoah Caverns, Zeigler, Linville Lime Co. Siding, Zirkle.

Rate of 25½c. Present rates: Combination of rates to and from Alexandria, Va.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.		1.30	1.10	1.00	1.00	
Frederick, Mo.	.50@ .75	1.35@1.45	1.15@1.25	1.10@1.20	1.05@1.15	1.05@1.10
Ft. Spring, W. Va.	.35	1.30	1.30	1.25	1.20	1.15
Munns, N. Y.	1.00	1.40	1.25	1.25	1.25	
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.75	1.35	1.15	.95	.85	1.35
Walford, Penn.			1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.						.50@1.50
Alton, Ill.	1.85		1.85			
Columbia and Krause, Ill.	.90@1.25	.80@1.35	1.00@1.35	.90@1.35	.90@1.35	
Cypress, Ill.	1.00@1.25	1.00@1.25	1.20@1.25	1.20@1.25	1.20@1.25	1.35
Dubuque, Iowa (h)	.85	1.00	1.35	1.35	1.35	1.35
Greencastle, Ind.	1.25	1.10	1.10	1.10	1.00	1.00
Lannon, Wis.	.80	1.00	.90	.90	.90	.90
Linwood, Iowa	1.10	1.50	1.50	1.30	1.40	1.40
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.		.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Northern Ohio Points	.85@1.10	1.25	1.15	1.10	1.05	1.05
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75		1.20	1.10	1.00	1.00
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada (m)	2.50	3.00	3.00	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90@1.20			1.75		1.75
Waukesha, Wis.		.90		.90	.90	.90
Wisconsin Points	.50		1.00	.90	.90	
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Cartersville, Ga.	1.25	1.65	1.65	1.35	1.15	1.15
Chico, Texas	1.00	1.30	1.25	1.20	1.10	1.05
Cutler, Fla.	.50r@ .60r			1.75r		1.10r
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	
Graystone, Ala.		Crusher run, screened, $1 per ton				
Kendrick and Santos, Fla.		3½ in. and less, $1 per ton				
Olive Hill, Ky.		1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35e	1.25d	1.20
Cape Girardeau, Mo.	1.25		1.25	1.25	1.00	
Rock Hill, St. Louis, Mo.	1.00	1.25	1.00@1.25	.90@1.25	.90@1.25	.90@1.25
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

(r) Cubic yard.

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35		1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	
New Britain, Plainville, Rocky Hill, Wallingford, Meridan, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	
Northern New Jersey	1.40@1.45	1.80@2.10	1.80@1.90	1.40@1.50	1.40@1.50	
Richmond, Calif.	.75		1.00	1.00	1.00	
Spring Valley, Calif.	.75	1.10	1.10	1.10	1.10	
Springfield, N. J.	1.40	2.10	2.00	1.60	1.60	
Toronto, Canad (m)		5.80	4.05	4.05		
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	
Cayce, S. C.—Granite	.50		1.80	1.80	1.65	
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00		2.35			
Lithonia, Ga.—Granite	.75a	2.00b	2.00	1.40	1.40	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	
Middlebrook, Mo.	3.00@3.50		2.00@2.25	2.00@2.25		1.25@3.00
Richmond, Calif.—Quartzite	.75		1.00	1.00	1.00	
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.			1.30	1.25	1.20	1.20

(a) Sand. (b) to ⅜ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¾ in., 1.45; 2 in. to ¾ in., 1.35. High calcite fluxing stone. 1.40. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (m) Plus .25 per ton for winter delivery. (n) Crusher run for ballast, .85. (p) Carload prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yd.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh.. 6.00

Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh 1.50

Blackwater, Mo.—100% thru 4 mesh.. 1.00

Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh 5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 3½%; 90% thru 50 mesh 1.50

Cartersville, Ga.—50% thru 50 mesh.... 1.50

Pulverized, per ton 2.00

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk 2.50

Cypress, Ill.—Analysis, 88% $CaCO_3$; 10% $MgCO_3$; 50-90% thru 4 mesh.. 1.25
50-90% thru 100 mesh 1.35

Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked 5.00

Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags 3.95

Bulk 2.70

Jamesville, N. Y. — Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags 4.25

Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh.... 3.50

Knoxville, Tenn.—80% thru 100 mesh; bags, 1.25; bulk 2.70

Linwood, Iowa—Analysis, 98% to 94% $CaCO_3$; 1.1% and less $MgCO_3$; 99% thru 150 mesh; paper sacks..... 6.00

Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk 1.75

Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk 2.25

Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton 2.00

Middlebury, Vt. — Analysis 99.05% $CaCO_3$; 90% thru 50 mesh; bulk, 4.00; paper bags 5.00

Milltown, Ind. — Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk 1.35@ 1.60

Olive Hill, Ky.—90% thru 4 mesh..... 1.00

Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100 2.50@ 2.75

100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk 3.60

99% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk 2.00

Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk 2.50

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 95% thru 10 mesh..... 1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — 50% thru 100 mesh	1.50
Danbury, Conn.; Adams, Ashley Falls and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MaCO_3$; 90% thru 100 mesh, bulk	3.50
100-lb. paper bags	4.75
100-lb. cloth bags	5.25
(All prices less .25, 15 days.)	
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.00
Kansas City, Mo. — 50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Linwood, Iowa—Analysis, 98% $CaCO_3$, 1.10% or less $MgCO_3$; 99% thru 4 mesh	1.10
99% thru 10 mesh	1.25
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.25
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	.90@1.50

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill. — Analysis, 50% $CaCO_3$; 42% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra)	3.50
Linwood, Iowa — Analysis, 94-98% $CaCO_3$; 1.10% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks	6.00
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75@ 2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.30@ .35
Ohlton, Ohio	2.50@ 3.00
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00@ 5.00
Silica and Mendota, Va.	2.00
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio		1.25
Eau Claire, Wis.		4.30
Estill Springs and Sewanee, Tenn.	1.35@1.50	1.35@1.50
Franklin, Penn.		1.75
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ohlton, Ohio	2.00	2.00
Ottawa, Ill.	1.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N.J.	.65	.55	1.00	1.35	1.40	
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05		1.05
Erie, Penn.	.60	.80			1.40	
Leeds Junction, Me.		.50		1.75	1.25	1.00
Machias Jct., N. Y.	.75	.60	.75		.60	.60
Montoursville, Penn.	1.00	.80	.75	.65	.65	.60
Northern New Jersey	.60	.60	1.25		1.25	
Somerset, Penn.		2.00				
Troy, N. Y.	.50@ .75*	.50@ .75*	.80@1.00*	.80@1.00*		.80@1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75		1.75
Washington, D. C.	.55	.55	1.20@1.50	1.20	1.00	1.00
CENTRAL:						
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.50	.35	.20	.50	.60	.60
Barton, Wis.		.40	.60	.65	.65	.65
Chicago District	2.00j					
Columbus, Ohio¶		.85	.85	.85	.85	
Des Moines, Iowa		.40	1.50	1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.		.40	.55	.95	.85	
Elkhart Lake, Wis.	.60	.40	.50	.60	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50		.60		.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mankato, Minn.		.45g		.60@1.25h	.70@1.25	1.25e
Mason City, Iowa		.50	.85	1.30	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.65*	.65*	1.75*	1.75*	1.75*	1.75*
St. Louis, Mo.	1.20e	1.45f	1.55a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	2.75	.60	.85	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.15	1.10
SOUTHERN:						
Brewster, Fla.	.50	.50	3.00	3.00		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.		.45				
Fort Worth, Tex.	1.50	1.00@1.35	1.10@1.25	1.10@1.25	1.00@1.10	1.00@1.10
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.		.50		.90	.90	
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, Fla.	.15	.15	1.25	.75	.65	.65
WESTERN:						
Kansas City, Mo.	.70	.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Otay, Calif.		.35@ .50	.60	.60	.60	.60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.25*	1.15*	1.10*
Pueblo, Colo.	.80	.60		1.20		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.		.75				
Des Moines, Iowa	.60					
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Fls., Wis					.65	
Fort Worth, Tex.						.85@ .90
Gainesville, Texas						.55
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35					
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Somerset, Penn.		1.85@2.00		1.50@1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.35 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in. (j) Lake sand, 1.75, delivered. (k) 60-70% crushed boulders.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25			4.00	
Beach City, Ohio	1.75@2.25	1.75@2.25		1.75	1.75		
Dresden, Ohio	1.25@1.50	1.25@1.50	1.50@1.75	1.00@1.25			
Eau Claire, Wis.						3.00	
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Kerrs, Ohio	1.10@1.50	1.25@2.00	2.00			2.75@3.00	
Massillon, Ohio	2.25	2.25		2.25	2.50		
Michigan City, Ind.				.30@ .35			
Montoursville, Penn.				1.35@1.50			
New Lexington, O.	2.00	1.25					
Ohlton, Ohio	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Ottawa, Ill.	1.25	1.25	1.25	1.75	1.25	3.50	2.00
Red Wing, Minn. (d)					1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Mendota, Va.	Potters flint, 7.00@10.00						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70		.75	1.00		
Warwick, Ohio	1.50*@2.00	1.50*@2.00		1.50*@2.00			
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand, 3.00@4.25. (f) Crude and dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	⅜ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.45*		1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	.75	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.					5.00			
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[12]
Williamsport, Penn.	10.00@11.00	8.50@9.00	8.50@9.00		7.00	9.00	5.00	
York, Penn., & Oranda, Va.	11.50[7]	8.50@9.50[7]	8.50@9.50[7]	8.50@10.50[7]	8.00	9.25	7.00	1.40[6]
CENTRAL:								
Afton, Mich.							7.50	1.35
Carey, Ohio	11.50	7.50	7.50		8.00		8.00	1.50
Cold Springs, Ohio		8.00	8.00					
Gibsonburg, Ohio	11.50				8.00	10.00		
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio[6]	11.50							
Milltown, Ind.		8.50@10.00		10.00[5]			8.50[22]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Scioto, Ohio	11.50	7.50	7.50	8.50		.62½	7.50	1.50
Sheboygan, Wis.		10.50					9.50	2.00[4]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	11.50	7.50	7.50	12.50	9.00	10.00[9]	9.00	1.50[2]
SOUTHERN:								
El Paso, Texas							7.00	
Frederick, Md.		8.00@9.50	8.00@9.50			9.50[15]	7.00[15]	
Graystone & Landmark, Ala.	12.50	9.00		12.50			7.50	1.35
Keystone, Ala.		10.00	8.00	10.00	8.00		8.00	1.50
Knoxville, Tenn.	19.25	8.50	8.50	8.50			6.00	1.15
Ocala, Fla.		10.00	9.00				10.00	1.40
WESTERN:								
Kirtland, N. M.							15.00	
Los Angeles, Calif.	15.00	14.00	12.00	18.00			13.50	
San Francisco, Calif.	19.50	16.00	13.00	19.50	14.50	.80	14.50	1.85
Tehachapi, Calif.[13]	17.00	15.00	12.00@15.00[21]	17.00	16.00		16.00	2.00
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[2] Barrels. [3] Net ton. [5] Wooden, steel 1.70. [4] Steel. [6] 180 lb. [7] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [9] In paper bags, including bags. [8] To 11.00. [10]80-lb. [12] To 1.50. [21] Refuse or air slack, 10.00@12.00. [13] To 3.00. [15] Delivered in Southern California. [16] To 8.00 [16] To 1.70. [22] To 9.00 [20] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc (for grinding) 5.00@50.00
- Ground talc (20-50 mesh), bags 5.75@ 8.00
- Ground talc (150-200 mesh), bags 6.50@15.50
- Pencils and steel crayons, gross .75@ 2.75

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 9.00@ 9.50
- Same, burlap bags, bags extra 8.00@ 8.50

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Cromleys Mt., Md.:
- Crude talc 6.00@ 7.00

Dalton, Ga.:
- Crude talc (for grinding) 5.00
- Ground talc (150-200 mesh), bags 12.00
- Pencils and steel worker's crayons, per gross 1.00@ 2.50

Emeryville, N. Y.:
(Double air floated) including bags;
- 325 mesh 14.75
- 200 mesh 13.75

Glendon, N. C.:
- Ground talc (150-200 mesh), bulk 6.00@10.00
- Ground talc (150-200 mesh), bags 8.00@14.00
- Pencils and steel crayons, gross 1.05@ 2.00
- Blanks, .08 per lb.; cubes 50.00

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh 15.50@20.00

Henry, Va.:
- Crude (mine run) 3.50@ 4.00
- Ground talc (150-200 mesh), bags 7.50@14.00

Joliet, Ill.:
Ground talc (150-200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00@30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Columbia, Tenn.—B.P.L. 65-70% 3.50@ 4.50
- Gordonsburg, Tenn.—B.P.L. 65-70% 3.75@ 4.00
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.00@ 5.50
- Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
- B.P.L. 75% 6.00
- Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00@ 9.00

Ground Rock

(2000 lb.)

- Centerville, Tenn.—B.P.L. 65% 8.00
- Gordonsburg, Tenn.—B.P.L. 65-70% 4.00@ 4.50
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.00@ 5.50
- Twomey, Tenn.—B.P.L. 65% 8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

- Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68% 3.25
- 70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

- Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb. .06
- Scrap, per ton, carloads 20.00
- Rumney Depot, N. H.—Per ton,
- Mine run 300.00
- Clean shop scrap 25.00
- Mine scrap 22.50@24.00
- Roofing mica 37.50
- Punch mica, per lb. .12
- Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt. — English pink, English cream and coral pink	¶12.50@‖14.50	¶12.50@‖14.50
Brighton, Tenn.—Pink marble chips	§3.00	§3.00
Crown Point, N. Y.—Mica spar		9.00@10.00
Easton, Penn.—Green stucco		12.00@18.00
Green granite		14.00@20.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash		11.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.—Middlebury white	¶9.00@‖11.00	¶9.00@‖11.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		4.00@ 5.50
Phillipsburg, N. J.—Royal green granite		14.00@18.00
Randville, Mich.—Crystalite crushed white marble, bulk	4.00	4.00@ 7.00
Rose pink granite, bulk		12.00
Stockton, Calif.—"Natrock" roofing grits		12.00@18.00
Tuckahoe, N. Y.—Tuckahoe white	10.00	
Warren, N. H.		¶7.90@‖8.95
Wauwatosa, Wis.		20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

†C.L. L.C.L. 16.00.
§Bulk, car lots, minimum 30 tons.
¶C.L. ‖L.C.L.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; analysis, K_2O, 9.63%; Na_2O, 1.01%; SiO_2, 69.72%; Fe_2O_3, .00%; Al_2O_3, 18.6%; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 40 mesh to 200 mesh	15.00@28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 11.55@12.80; bulk	10.00@11.50
Pulverized, 95% thru 200 mesh; bags, 19.73@23.50; bulk	18.43@22.20
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; Si_2O, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk (Bags 15c extra.)	18.00
Crude feldspar, bulk	9.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass. (Limestone)	‡7.50@*9.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton, including sacks	13.00
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	8.00
Wisconsin Points—(Limestone), per ton	15.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	9.00@10.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	13.00@16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	13.50
Hartford, Conn.	17.50*
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.50
Madison, Wis.	12.50a
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50@15.00*
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50b
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada	15.00†
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M, 10th of month. (d) 5% disc., 10th of month.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	84¼	3.37
Atlanta, Ga.		2.35
Baltimore, Md.		2.15‡@2.25
Birmingham, Ala.		2.10
Boston, Mass.		2.13@2.33
Buffalo, N. Y.		2.00‡@2.10
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa		2.24
Charleston, S. C.		2.35
Cheyenne, Wyo.	.64	2.56
Chicago, Ill.	.51¼	2.05
Cincinnati, Ohio		2.22
Cleveland, Ohio		2.24
Columbus, Ohio		2.22
Dallas, Texas		2.00
Davenport, Iowa		2.24
Dayton, Ohio		2.24
Denver, Colo.	.63¾	2.55
Des Moines, Iowa		2.05
Detroit, Mich.		1.90
Duluth, Minn.		2.04
Houston, Texas		2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.		2.02
Jacksonville, Fla.		2.20
Jersey City, N. J.		2.03‡@2.13
Kansas City, Mo.		1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.		2.04
Milwaukee, Wis.		2.20
Minneapolis, Minn.		2.12@2.22
Montreal, Que.		1.60
New Orleans, La.		2.07
New York, N. Y.		1.93‡@2.03
Norfolk, Va.		2.07
Oklahoma City, Okla.		2.46
Omaha, Neb.		2.36
Peoria, Ill.		2.22
Philadelphia, Penn.		2.11‡@2.21
Phoenix, Ariz.		3.26
Pittsburgh, Penn.		2.04
Portland, Colo.		2.80
Portland, Ore.		2.40‡@2.60
Reno, Nev.		2.91
Richmond, Va.		2.24‡@2.40
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.		2.21
Savannah, Ga.		2.50
St. Louis, Mo.		1.95
St. Paul, Minn.		2.12@2.22
Seattle, Wash.		2.70
Tampa, Fla.		2.25
Toledo, Ohio		2.20
Topeka, Kan.		2.41
Tulsa, Okla.		2.33
Wheeling, W. Va.		2.12
Winston-Salem, N. C.		2.29

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Bellingham, Wash.		2.40
Buffington, Ind.		1.80
Chattanooga, Tenn.		2.45*
Concrete, Wash.		2.35
Davenport, Calif.		2.45*
Hannibal, Mo.		1.90
Hudson, N. Y.		1.75
Leeds, Ala.		1.65
Lime and Oswego, Ore.		2.50‡
Mildred, Kan.		2.35
Nazareth, Penn.		2.15
Northampton, Penn.		1.75
Richard City, Tenn.		2.05
Steelton, Minn.		1.85
Toledo, Ohio		2.20
Universal, Penn.		1.80

NOTE—Add 40c per bbl. for bags.
*Includes sacks. ‡10c discount, 15 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	¼x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50	———	———	———	———	———	15.00	20.00
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	———	———	———	———	11.70u	———	———	———
Blue Rapids, Kan.	1.70	4.00	———	———	———	———	10.00	———	———	———	———	15.00	20.00
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	———	———	13.50	———	———	———
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	———	———	———	———	14.30o	12.30m	———	m9.00@11.00o	———	———	———	———	———
Delawanna, N. J.	———	———	———	———	———	———	———	7.25	———	———	13.00	14.00	———
Douglas, Ariz.	———	———	6.00	14.50	15.00	———	18.00	———	30.00	———	———	———	———
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50	———	———	———	19.00	———	15.00	20.00
Grand Rapids, Mich.	1.70	4.00	6.00	9.00	9.00	9.00	———	———	———	19.00	———	15.00	20.00
Gypsum, Ohio	1.70@3.00	4.00	6.00	7.00@9.00	9.00	9.00	19.00	7.00	24.50	19.00	———	15.00	20.00@25.00
Los Angeles, Calif.	———	7.50@9.00	7.50@9.00	———	11.50@13.50	———	———	———	———	———	———	———	———
Medicine Lodge, Kan.	1.70	4.00	———	———	———	———	———	———	15.00	———	———	15.00	20.00
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	———	20.00	30.00
Portland, Colo.	———	———	———	10.00	———	———	———	———	———	———	———	———	———
San Francisco, Calif.	———	———	9.00	13.40	14.40	———	15.40	———	———	———	———	———	———
Seattle, Wash.	6.10	10.50	10.50	———	———	———	———	———	———	———	———	———	———
Sigurd, Utah	———	———	———	———	———	———	———	———	21.50	———	———	———	———
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	———	———	———	———	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) Hardwall plaster, 13.00; casting, finishing, molding, 14.00. (m) Includes paper bags; (o) includes jute sacks; (u) includes sacks.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Chicago District	200.00¶	.....	.....
Columbus, Ohio	16.00	.....	.....
Detroit, Mich.	.15@ .17†	.....	.24@.26†
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	15.00*	.....	.....
Graettinger, Iowa	.16@ .18	.....	.....
Indianapolis, Ind.	.10@ .12a	.....	.....
Los Angeles, Calif.	4x8x12—5.00*	4x6x12—4.20*	
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.18@ .20	.....	.....
Tiskilwa, Ill.	.16@ 18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.	
Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
1x4	.60

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Chicago District (Haydite):	
4x 8x16, per M	140.00
8x 8x16, per M	220.00
8x12x16, per M	300.00
Columbus, Ohio:	
5x8x12	6.50
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12	8.00
Longview, Wash.:	
4x6x12	5.00
4x8x12	6.25
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
	Per 100
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
	Each
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .13; 12-in., .17½; 14-in., .25; 16-in., .32; 18-in., .40; 20-in., .50; 24-in., .80; 26-in., 1.00; 28-in., 1.10; 30-in.	1.25
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per M:	
3 in.	40.00
4 in.	50.00
6 in.	75.00
8 in.	100.00
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	.....
Chicago District	16.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Clinker	11.00	.....
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	20.00@32.00
Mt. Pleasant, N. Y.	.....	14.00@ 23.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	23.00@ 55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	18.00	30.00@35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich.	4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off																
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.	Sewer pipe 40% off list; culvert—list																
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.	6 in. to 24 in., $18.00 per ton																
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.	12.00 per ton																
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	.70	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	.15	.17	.22½	.30	.40	.55	1.20	1.70	.....	2.00	.....	2.75	3.40	.....	6.50	.....	.....
Wahoo, Neb (b)	.....	.....	.....	.....	1.00	1.13	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	.....
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced. (c) Delivered on job; 5% discount, 10th of month. †21-in. diam. ‡Price per 2-ft. length.

Recent Contract Prices for Rock Products

CONTRACTS recently let on bids received for rock products are as follows:

Portland, Ore.—The Columbia Contract Co. and the Star Sand Co. submitted the following bids to the county commissioners for the furnishing of crushed rock for use of the road department. The bids are: For crushed stone, 3 in. to 1½ in. size, 825 cu. yd. lot, Columbia Contract Co., $1.60 per cu. yd.; Star Sand Co., $1.75 per cu. yd.; for 1½ in. to ¾ in. size, 750 cu. yd. lot, Columbia Contract Co., $1.60 per cu. yd.; Star Sand Co., $1.90 per cu. yd.; for 100 cu. yd. screenings, Columbia Contract Co., $1.60 per cu. yd., and Star Sand Co., $1.90 per cu. yd.

Olympia, Wash.—Floyd Rineholt, Granga, Wash., was awarded contract for placing in bunkers 7500 cu. yd. of crushed stone for surfacing in Kittitas county. The bid was $8175, which amounts to $1.09 per cu. yd.

Canadian Gypsum Syndicate Formed

THE Big Harbor Gypsum Syndicate, a Canadian organization, has been formed to acquire an option on rich deposits of gypsum located on Boularderie Island, Victoria county, Cape Breton Island, Canada. The property is regarded favorably in mining circles in Nova Scotia, and the syndicate has engineers' reports which estimate that there are at least 10,000,000 tons of gypsum in the deposit. The property can be worked easily, labor is readily obtained and the output can be shipped by water. There is a satisfactory market for the production since the output of gypsum in Canada has been steadily increasing in recent years, due to the increasing variety of uses to which the mineral is put.

The syndicate is being financed by an offering of 3500 units at $50 each. Ultimately it is intended to form a company to be known as the Big Harbor Gypsum Corp., which will be capitalized at 5,000,000 shares. Each unit holder will receive 500 shares of the capital stock of the company for each syndicate unit.

Cement Products

An Unusual Man, Product and Plant

Ralph W. Albrecht Heads the Plastic Products Co. of Milwaukee, Wis., Manufacturers of Cast Stone

By J. Alton Reitzel

FROM a little province of Russia, now ceded to Poland, came an immigrant boy a little over a quarter of a century ago. The province of Volhynia was the home of the boy's father and the tiny state had been in constant turmoil for centuries. Today Ralph W. Albrecht, that immigrant youngster, is president of the Plastic Products Co. of Milwaukee. When interviewed in his office recently, we found a charming man, careful of his speech, and with a smile that put the interviewer immediately at his ease.

Mr. Albrecht's father was a trader of German extraction, taking hardwood timber and livestock from Russia to Germany. On his return trip from Germany to the "land of the Czars" he brought finished products —clothes, food, trinkets. When the political situation in Volhynia became strained, and the fight for domination came to head, all of the elder Albrecht's property was confiscated. The family migrated to America to begin anew—and this is the beginning of the story of Ralph W. Albrecht.

Desiring to learn the English language he started to work in a grocery store in Milwaukee at $65 a month. His next job pointed the way to his career—he entered a cast stone plant as an apprentice.

Beginning as Apprentice in a Cast Stone Plant

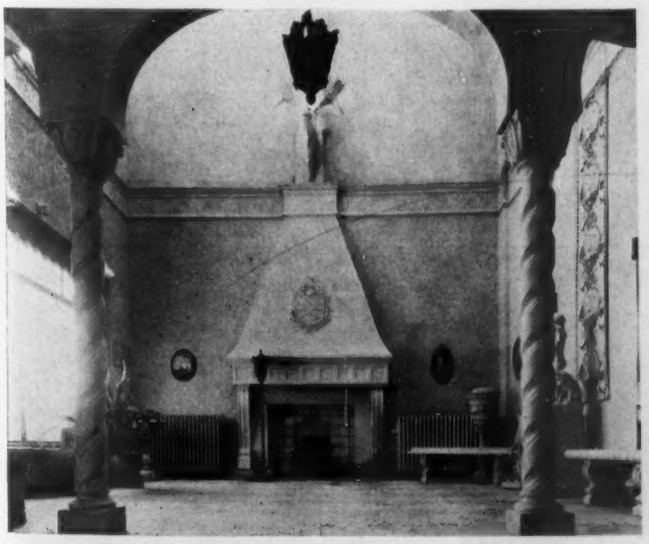
"I wanted to learn a trade," Mr. Albrecht said, "and I was willing to start at $6 a week. For seven years I served my apprenticeship, four years in the shop and three years in the field. And at the end of my training period I was $300 in debt."

Borrowing enough money to purchase five shares of stock Mr. Albrecht bought an interest in the business. He saw a real future for cast stone and decided to remain in the field.

"From 1911 to 1915 all any of us did was to chuck in every dime we could to try and keep the business afloat. These were the leanest years of the business and all the members of the company were about willing to give up the enterprise. I was too young to realize the seriousness of the situation and managed somehow to keep the organization together.

"In 1916 we landed our first sizable cast stone job—the Memorial Building of Lawrence College at Appleton, Wis. This contract was literally a life saver for us and enabled us to see the future of cast stone a bit more clearly."

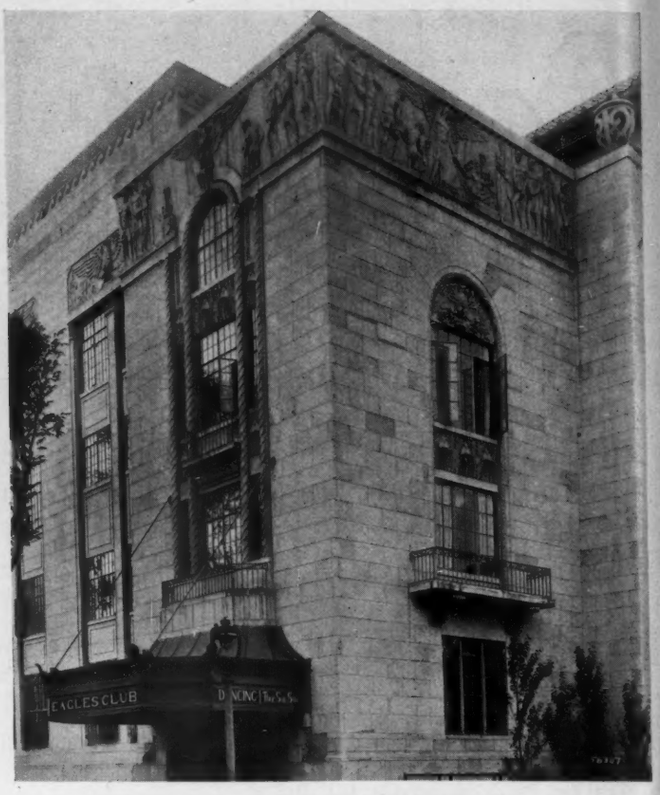
The Plastic Products Co. furnished and erected all the cast stone for the fluted columns, the entire pediment, cornices, capitols and balustrades surrounding the building and the tower. The company also furnished the entire plaster work for the interior. Architects had originally specified cut stone for the Appleton job but the war had placed an



A fireplace setting entirely of "plastic products." The archway, benches, urn and statuary are all of concrete

A portion of the Plastic Products Co. showroom, where customers may find the products artistically displayed

View in the company's showroom, displaying a wide variety of cast products for interiors



The Eagles Club, Milwaukee, provides an excellent example of cast-stone art

embargo on stone and cast stone got the bid.

Naturally the World War put somewhat of a damper on the young company. In 1918 Mr. Albrecht was elected president of the organization although he was not a majority stockholder.

"After the war we were ready to sell our business, plant and everything for $3,000. Being too young to have the smirch of bankruptcy upon me and because I hadn't much to lose and a lot to gain I decided to stick by the business." By 1923 the cast stone business was beginning to get genuine recognition. The Plastic Products Co. had prospered and Mr. Albrecht gained control of the business by purchasing stock at $133 a share. Today the physical assets of the plant alone are worth $100,000 and this does not take into consideration the good will or patterns.

The new plant is located six miles from the center of Milwaukee. Competitors predicted dire things for the Plastic Products Co. when it moved from near the center of the city to this location—but again the judgment of the president has been right.

"Here we are ready to serve bigger and bigger contracts," Mr. Albrecht explained, "we have room for expansion. A cast stone business must prepare, as any other business must, for the future. As long as we had cramped quarters we were not in position to put our business on a firm foundation. In answering the prediction that we were making a mistake in moving out here I have but one thing to say: A man never knows how a thing will work out until after he has tried."

Special pattern and mold department where intricate designs are worked out in the modern, daylight plant of the Plastic Products Co.

Straight-Line Layout Found in This Plant

Straight-line production is used in this modern cast stone plant. There is but little waste motion and the product is routed from the raw material to the shipping platform in the fastest time possible. Not only does the plant turn out cast stone, but hard plaster ornaments and designs, vases, sun-dials, benches and all sorts of ornaments for home, garden and public buildings.

A study of the interior views of the plant will show the method of procedure, the curing rooms and the material storage section. Every piece of cast stone is cured under the proper conditions of moisture and temperature in the specially designed rooms. Proper curing with the designed mix used by the Plastic Products Co. insures a stone that will last indefinitely, keep its color and not only take the place of cut stone but fill it better.

Overhead tracks enable the material and the finished product to be handled with the minimum of human effort. The railroad

track runs directly into the building enabling the unloading of material with dispatch and facilitating the shipping of the product.

When a specific problem in decoration is submitted to the company by an architect a model in clay is made by the artist. This model is submitted to the architect for his approval and if the decorative piece is approved the mold is then made. Every mold

Decorative mummy for theater building designed by the company's artist

is made in the modern pattern department of the company.

When a sand finish is desired on the stone, sand is tamped in the prepared mold before the concrete is placed. If a definite cut stone job is ordered the molds are made of a rubber composition to give the back cut that characterizes cut stone.

Not only does the Plastic Products Co. design and furnish the cast stone for a building but it will do all the ornamental plaster work and interior decoration, as well. This enables the architect to center all of his ornamental and cast stone needs in one company.

An impressive cast stone job recently turned out by the company was for the

The mold-making department of the plant. The stone in the foreground is finished and ready for curing

Eagles club at Milwaukee, Wis. The club is recognized as one of the finest ever erected by this fraternal organization. Cast stone was adopted throughout as the medium of interpretation of the architect's design. The architect was Russell Barr Williamson. The building is a striking example of concrete and cast stone for both carrying the heavy structural parts of the building and adorning and beautifying it. The sculptured frieze at the top of the building, symbolizing the fraternal features of the organization, called for intricate details of design for which cast stone only could be depended upon for proper expression.

Advantages of Cast Stone

Commenting on his product, Mr. Albrecht has this to say: "Cast stone offers many advantages which other materials lack. The possibilities of reinforcing are such that any intricate design can be carried out in cast stone which would prove impractical with other materials. This is especially true where delicate artistic designs must be combined with strength. I believe the future of cast stone holds great possibilities—in fact, we are beginning to get the effect now."

Mr. Albrecht attributes the success of his business to the following guideposts:

"Understand what the officers must do. Every man must have his place and take care of his own problems.

"When starting a business, court the small jobs where profits are assured. We needed profits to pull us out of the hole—we did not bite off more than we could chew.

"Know your costs. You must know what an article costs to figure the selling price.

"Don't cut a price to get a job. Cast stone and all our products can stand on their merit of quality. Cast stone is not a substitute but the best thing to use."

A decorative fountain for home or garden

Plans 24 Products Plants

PLANS for the establishment of a chain of 24 plants for the manufacture of synthetic stone are being made by Royal Muralite, Inc., of Shreveport, La. The new plants are to be located in Louisiana, Texas and Arkansas, and will manufacture stone for both interior and exterior construction. Judge W. R. Haile is president of the company with office at Shreveport.

Shearman Concrete Pipe Co. to Build Two Plants

THE Shearman Concrete Pipe Co. of Knoxville, Tenn., has started the construction of two new plants for the manufacture of cement pipe. Ground has already been broken for the new plant of the Kentucky Shearman Concrete Pipe Co. at Frankfort, Ky. This company is a subsidiary of the main company, at Knoxville and will manufacture all the Shearman pipe for the state of Kentucky. At Frankfort, a 12-acre tract has been obtained and railroad track connections are being made. The plant, which will turn out pipe as large as 96 in. in diameter, is expected to be placed in operation during July.

The other plant to be erected will be at Chattanooga, Tenn. It will have a capacity of 100 tons of pipe daily.

Bureau of Standards Tests on Fire Resistance of Brick Walls

THE United States Bureau of Standards has recently issued the preliminary report of its investigation of fire tests on brick walls. In this report there are a number of results given which are of great interest to manufacturers of concrete brick, and the table below outlines these data and provides some really significant figures. The Bureau of Standards' bulletins, Nos. 124 and 132, furnish the detailed information on this subject.

Kind of brick	Nominal thickness	Building members projecting into wall	Fire resistance periods—hr.
Concrete	8-in. unplastered	None, or incombustible	6½
	8-in. unplastered	Combustible	3
	12-in. unplastered	None, or incombustible	15
	12-in. unplastered	Combustible	12½
Clay	8-in. unplastered	None, or incombustible	5
	8-in. unplastered	Combustible	2
	12-in. unplastered	None, or incombustible	10*-13**
	12-in. unplastered	Combustible	9

*Determined by load-carrying ability.
**Determined by temperature transmission only.

New Concrete Brick Company Organized in Houston

A NEW company, to be known as the Houston H-Brick Corp., has been organized in Houston, Tex., to manufacture concrete brick of the "H-brick" type. The company has leased a site in Houston, 250 x415 ft., and will start constructing a plant building which will be 80x100 ft. The plant will cost $30,000, and will have a daily capacity of 25,000 units. Three machines will be installed for the first unit and subsequent units will be added later when the business warrants.

The organizers of the company include R. P. Mitchell, of Chicago; Harry L. Carter, San Antonio; J. Hnatek, Victoria, Tex.; R. P. O'Brien, Houston; C. Richey, Houston; and J. J. Rick, of Houston. Frank D. Conklin is general manager of the new corporation. The company has acquired the patent rights on H-brick in this territory and will manufacture the units on a royalty basis.—*Houston* (Tex.) *Post.*

Cincrete Products Company Under New Ownership

ANNOUNCEMENT that the Cincrete Products Co. has been acquired by the Cincrete company, controlled by a group of Wisconsin, Illinois and Indiana men, was made recently. The Cincrete Products Co. has been operating under a trusteeship since 1920.

Under the new management the local plant will be enlarged and its production capacity nearly doubled, officials of the company say. The Cincrete Products Co. was founded in 1925 by L. E. Pitner, who will be vice-president and general manager in the reorganization. — *Milwaukee* (Wis.) *News.*

Florida Concrete Products Men Meet

THE annual convention of the Florida Concrete Products Association was held at Orlando on May 24. The chief discussion of the meeting was on the standardization and improvement of concrete building units. During the past year an inspection service was put in operation to gain this end, and the result of this work has been to give the concrete units produced by association members the same insurance rating as has been accorded clay building units. The association also discussed promotion work for concrete units.

G. B. Hurlburt, of Newell-Hurlburt Co., Orlando, was elected president of the association, succeeding Greene Cannon of Tampa. Fred C. Hendrick of Jacksonville was named vice-president; Harry Switzer, Fort Myers, treasurer, and George L. Reed, Orlando, was re-elected secretary.

Two New Cement Mills Begin Production

MAY marked the entrance to the field of portland cement manufacture of two new mills—the Lawrence Portland Cement Co. plant at Thomaston, Maine, and the Volunteer Portland Cement Co. plant near Knoxville, Tenn. Both are of about the same capacity, 3000 bbl. per day, or 1,000,000 bbl. per annum. Both are wet process plants. Descriptions of these new plants will appear in later issues of ROCK PRODUCTS.

Machinery for New Cement Plant at Foreman, Ark., Reported on Ground

FIVE CARS of machinery and materials for the plant of the American Portland Cement Co. arrived May 19 at Foreman, consisting of a Baldwin standard-gage locomotive, 12 dump cars and railroad materials. A car of sand, one of cement and one of gravel arrived recently, to be used in the construction work—*Texarkana* (Texas) *Gazette.*

This is the company being promoted by C. E. Oxford, 245 West 51st street, New York City, of which the Hunt Engineering Co., Kansas City, Mo., are engineers.

New Cement Project Near Stockton, Calif., Rumored

REPRESENTATIVES and members of an eastern firm intending to take over the development of the cement industry in the Volcano section of Amador county, California, were in the county looking over the property recently.

At the present time surveyors are in the field and a survey is now being made embracing a tract of between 350 and 400 acres. Already representatives of the company have secured options from different property owners.

Different surface tests have been made on the properties embraced in the tract and with excellent results. At present drilling is under way to determine the extent of the cement producing rock, and from indications there is an extensive supply. Officials of the company who are promoting the project are enthusiastic over the possibilities.

At present plans are being made for the extension of a broad gage railroad line to the workings at Volcano, it is claimed an extension from Ione. Contracts are now pending for drilling on the property with a diamond drill.—*Stockton* (Calif.) *Record.*

New Kansas Quarry Operation

WORK at the stone quarry north of Alta Vista, Kan., will be started within the next 30 days, Brown and Catlett of Topeka, Kan., having started the work of installing equipment and erecting a couple of buildings. A mess hall, 16x50 ft., has already been completed, and a bunk house, 16x40 ft., is under construction. C. J. Catlett of the firm will have personal supervision of the operation of the quarry.

Brown and Catlett will operate the quarry under contract with the Shaw Stone and Ballast Co. of Chicago, and have contracted with the Rock Island railroad to furnish all their ballast. The first contract calls for 50,000 yd. in a year.—*Alta Vista* (Kan.) *Journal.*

Mid-West Crushed-Stone Producers Meet at Chicago

MEMBERS of the Mid-West Division of the National Crushed Stone Association met at the Great Northern hotel in Chicago for a brief session on June 5. In the absence of Col. O. P. Chamberlain, president of the Illinois Association, and W. R. Sanborn, regional vice-president of the National Association, H. E. Bair, general manager of the France Stone Co., Toledo, Ohio, a member of the executive committee of the National Association, presided.

The principal object of the meeting was to lay before the members in the Mid-West the work projected by the association's newly established research laboratory. President Otho M. Graves, of Easton, Penn., was prevented from attending by illness, but the association's work and prospects were very ably presented by A. T. Goldbeck, director of the bureau of engineering, and J. R. Boyd, secretary, of the National Association.

Following the presentation of the association's research program and needs, there was some discussion of the amount of support desired from the Mid-West group. It ended in the adoption of a resolution calling upon the president of the Illinois Association, Col. Chamberlain, to appoint a committee to interest members of the local association in larger support of the research work of the National Association.

The rest of the day was devoted to a discussion of the agricultural limestone situation in the Central States.

Iowa Crushed Stone Men Meet with National Association Officers

ON Monday, June 4, the Iowa Crushed Stone Association met at Dubuque to discuss a number of the problems of the local industry with the officers of the national association. Representing the national organization were A. T. Goldbeck, director of research, and J. R. Boyd, the national secretary, while representatives of a number of the larger Iowa producers were on hand to open the discussion. It was unfortunate that more of the producers could not have been at the meeting and availed themselves of this opportunity to meet with the national representatives and benefit by the discussion.

The talk centered on the feeling that the State Highway Commission was discriminating against the regular producer in favor of the contractor who might place a roadside crushing plant at any point along the length of his contract and produce his own stone. The discrimination was noted in that the highway commission would accept such stone from the contractor for highway use, but would reject similar stone if furnished by regular producers. It was felt that the commission had made road specifications which, in effect, aided the roadside producer and eliminated the regular producer. At the same time it was the opinion of the meeting that the state was actually paying more money for poorer roads through this arrangement.

A number of ways were suggested to meet these conditions. Paul Nauman of the Dubuque Stone Products Co. stated that a stronger association, possibly linked with the sand and gravel association as an aggregate association, could meet the situation if it set out to show its influence to the highway commission to counteract the influencing being carried on by the roadside producers and contractors. G. D. Rose of the Dubuque company said he hoped that the Iowa association could soon have its own full-time secretary who would be in a better position to watch lettings of contracts and carry on educational work than could any man who devoted only a portion of his time to the work. It was agreed that a larger organization could do a lot in setting right the present undesirable arrangement.

Stanley Hands, of the River Products Co. of Iowa City, stated that the highway commission recognized the fact that good concrete could be made practically without regard to the grading of the aggregate provided that sufficient cement was used. Mr. Hands then suggested that the thing to do was to show the state and the contractors that money could be saved by using less cement, if a better, though more expensive, grading of aggregate were employed. Mr. Goldbeck offered the assistance of the national association's laboratory for any work which would help to show the commission the wisdom of using good, clean, well-graded aggregate.

Mr. Rose stated that a set of specifications which would carry out Mr. Hands' idea should be prepared at once and submitted to the commission. Such a set of specifications could not be "knocked down" by the commission, and moreover would knock out the roadside producer of poorly graded aggregate. The specifications would be a guarantee of saving to the people of the state, and would guarantee to the contractor a responsible product and an assured volume. It was suggested that such a set of specifications could be prepared at the national laboratories. Mr. Goldbeck agreed that it could be done, and suggested that the solution depended on the precentage of voids, which could be controlled by correct specifications.

A number of guests were at the luncheon, including O. A. Kratz, city manager of Dubuque, and W. H. Cullen, city engineer. J. F. Schroeder, of the Linwood Cement Co.; Logan Blizzard, of the Marquette Stone Co., and J. H. Macdonald, of Dolese Bros. Co. of Davenport, were also at the meeting.

Many Engineers Attend Tennessee Crushed Stone Meeting

THE Tennessee Crushed Stone Association held a most successful meeting of the crushed stone producers and highway engineers of Tennessee in the state memorial building auditorium at Nashville on April 30. There were in attendance over 65 highway engineers from all over the state, including the chief engineer and his assistants; the division and construction engineers and their assistants, and the material engineers.

The feature of the meeting was an address by A. T. Goldbeck, director of the National Crushed Stone Association's bureau of engineering, on "The Influence of Aggregates on Concrete Road Design," which was of very real interest to all of those present.

At the conclusion of the meeting 50 of the engineers present asked that their names be placed on the national association's mailing list to receive the *Crushed Stone Journal* and Engineering Bulletins, which indicates the deep interest that these men are taking in the work of the association and particularly that of the bureau of engineering.—*Crushed Stone Journal.*

Wisconsin Rail Commission to Investigate Gravel and Stone Rates

THE Railroad Commission of Wisconsin has issued a formal notice that it will proceed to investigate joint line rates on crushed stone and gravel within the state. The commission acting on its own motion in this matter is of the opinion "that a joint rate on sand and gravel and stone, crushed, pulverized or ground, should not be established in any one case or situation to the exclusion of the consideration of all similar situations within the state, and the commission being of the opinion that a state-wide investigation should be undertaken of the question of establishing joint rates with respect to these commodities generally throughout the state between the following named carriers: Chicago, St. Paul, Minneapolis and Omaha railway; Minneapolis, St. Paul and Sault Ste Marie railway; Chicago and Northwestern railway; Chicago, Milwaukee, St. Paul and Pacific railroad; Chicago, Burlington and Quincy railroad, and Green Bay and Western railroad, and the facts exist sufficient to warrant such investigation."

The present single line rates on gravel and crushed stone are quite generally regarded as satisfactory, but the charge increases greatly over the single line rate for a joint line haul of the same distance. This increase is frequently so great as to prohibit the shipment of gravel to any point not on the same line with the gravel pit, according to complaints to the Wisconsin Association of Commerce.—*Green Bay* (Wis.) *Daily.*

New Machinery and Equipment

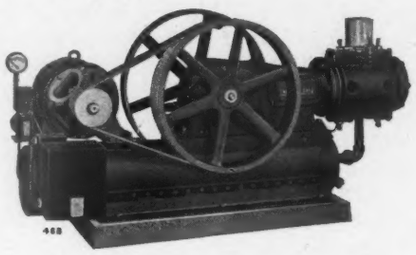
New ¾-Yd. Gasoline Shovel and Crane

THE BUCYRUS-ERIE CO., Milwaukee, Wis., announces that its new ¾-yd. gasoline shovel and crane, known as Type "1030," has just been placed in quantity production. This new machine is featured by its greater power and speed, together with more strength throughout, according to the statement of the manufacturers. The "1030" has a 72½-hp. gasoline motor which the company claims provides 30% more power than is found in other machines of this size. The speed of operation is also said to be greater, with a faster hoisting line speed, and a quicker swing than is found with the average gasoline shovels and cranes of a similar size. For the greater speed, oversize contracting-band clutches are used, with a large brake of the contracting shoe type to stop the swing. The swing gears are prevented from working apart and springing the shafts, by being enclosed in a steel housing which holds them in alignment.

The company claims particularly rugged construction and reliability throughout, stating that as an example, the drum shaft is 5½ in. in diameter, and the swing clutch shaft is 3⅝ in. in diameter. The truck frame is a one-piece steel casting, and the revolving turntable is also of one-piece steel construction.

Self-aligning ball bearings are used for running shafts above the deck. All high-speed gears are enclosed and run in a bath of oil, as do the the reversing bevel gears, swing gears, boom hoist and transmission. Driving gears of the caterpillar type mounting run in oil.

The weight of the machinery is placed to the rear of the center pin, providing better counterbalance and more stability when digging. This machine is mounted on the single-shaft drive, caterpillar-type mounting. The mounting has a two-way brake, locking the machine in either direction. The company claims easy accessibility for all parts of the mounting, as well as for the other parts of the new machine.



New self-contained, semi-portable air compressor

Single-Stage, Semi-Portable Air Compressor

THE Pennsylvania Pump and Compressor Co., Easton, Penn., has announced a new semi-portable, single-stage, double-acting, multiple-belt-driven air compressor which is claimed to be completely self-contained and fully equipped. The new unit is said to occupy a minimum of floor space due to compactness and efficiency.

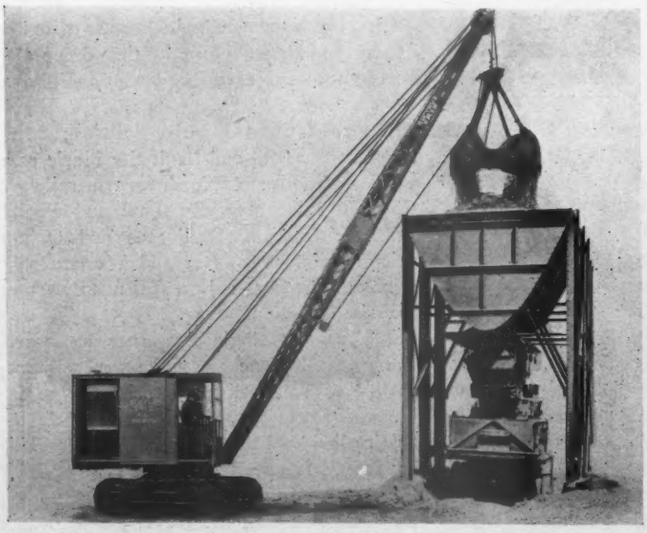
The unit is equipped with a 10-hp. high torque motor which operates the compressor at the moderate speed of 400 r.p.m., thus giving assurance of long life for the compressor, the manufacturers claim. The air cylinder and all the working parts are automatically lubricated, and the compressor is equipped with the special Pennsylvania air-cushioned valves. A hopper cooling tank can be furnished with the compressor if desired.

The piston displacement of the new unit is 65 cu. ft. free air, and the automatic pressure control is between 85 and 125 lb. The unit has overall dimensions of 6 ft. 6 in. by 2 ft. 4 in. It weighs 1380 lb.

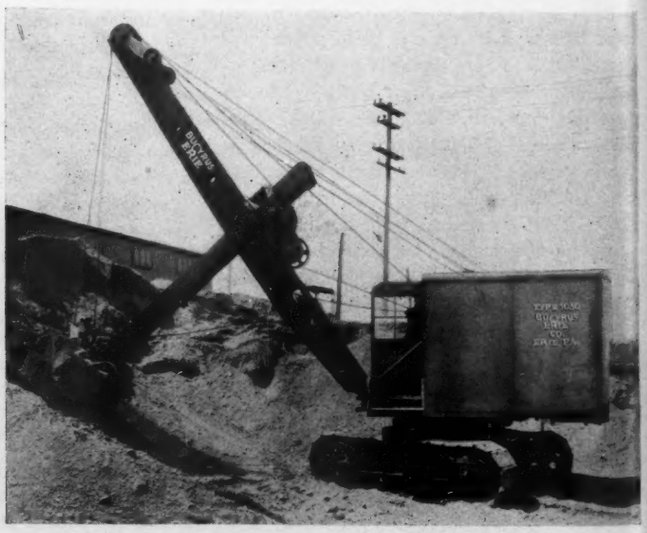
The compressor is designed to meet the demand for compressed air in garages, and hence should be of interest to readers who maintain company garages and fleets of motor trucks. It is also valuable for smaller producers, whose air requirements are comparatively limited. This compressor is also built in a two-stage type for pressures from 125 to 250 lb.

Motor-Truck Concrete Mixer Moves to Cleveland

ANNOUNCEMENT is made by the Barrymore Corp., Graybar Building, New York City, that, effective May 1, its main office will be moved to the Union Trust Building, Cleveland, Ohio. A. P. McCallie, president, will remain in the east. George Gunn, Jr., formerly vice-president of the White Motor Truck Co., Cleveland, Ohio, has been elected vice-president and general manager of the Barrymore Corp. and will be in charge of its operations in Cleveland.



Convertible gasoline crane and shovel equipped with longer boom for use as crane

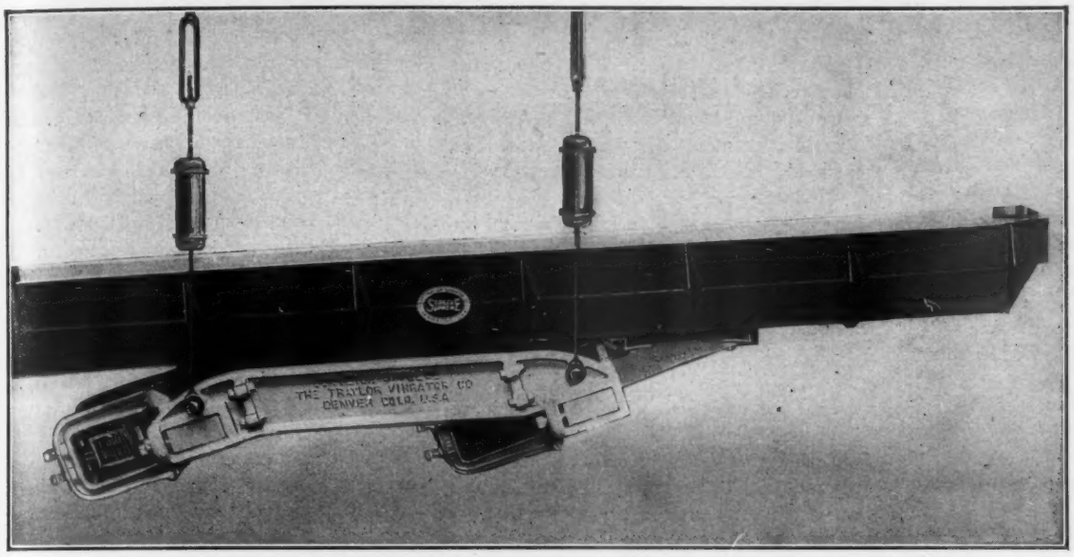


New 3/4 yd. convertible gasoline shovel and crane on an excavating job

New Vibrator Conveyor

TRAYLOR VIBRATOR CO., Denver, Colo., has announced an entirely new type of conveyor utilizing the vibrating principle for conveying. The new conveyor is a light-weight, self-contained, compact unit, and it is claimed that the operation is simple and the action is positive. It is said to require very little floor space, and to be capable of handling big tonnage, making it especially adaptable for distribution of material storages, loading of cars and all by-passing purposes. It can readily be used for feed to crushers, screens, etc. The manufacturers claim that this vibrator conveyor can be easily and inexpensively installed without need of a heavy framework or supporting structure. No vibration is transmitted to the building or conveyor supports, it is claimed. The conveyor may be had with surfaces 20 in., 36 in. and 48 in. wide.

No special electric current is required to operate the conveyor, since it operates under any standard a.c. current, with a generator set which is furnished as a part of the conveyor equipment. It is stated that the power consumed does not exceed 1 hp. No belts, pulleys, oil or grease are required.

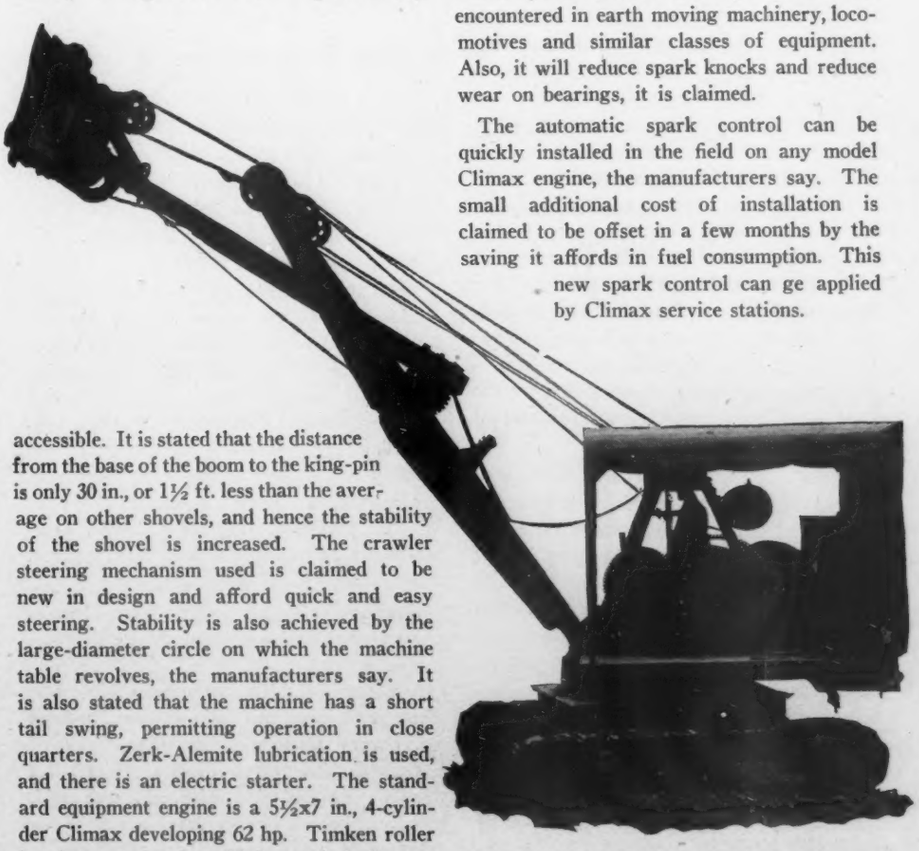


Conveyor utilizes the vibrating principle

New Full-Revolving Convertible Excavator

ANNOUNCEMENT has been made by the Bay City Dredge Works, Bay City, Mich., of its new ¾-yd., full-revolving convertible shovel, crane and trencher known as Type R. The new model is full crawler mounted with heavy crawlers having extra-width tread shoes. It is claimed to be very compact in design and easily operated by one man. Either gasoline or electric power can be provided. Standard equipment includes a fully-enclosed steel cab. The model is available with a standard ¾-yd. shovel dipper, with detachable manganese steel teeth, also with a heavy ⅝-yd. all-manganese rock dipper. Crane booms may be had in lengths of 35, 40 or 45 ft. to handle loads up to 10 tons. Crane buckets range from ½ to 1 cu. yd. clamshells and from ¾ to 1 cu. yd. draglines. A trench boom and scoop with trencher buckets ranging from 18 to 42 in. in width with a maximum digging depth of 20 ft. is also available.

The manufacturer claims a compact machinery arrangement with all parts easily accessible. It is stated that the distance from the base of the boom to the king-pin is only 30 in., or 1½ ft. less than the average on other shovels, and hence the stability of the shovel is increased. The crawler steering mechanism used is claimed to be new in design and afford quick and easy steering. Stability is also achieved by the large-diameter circle on which the machine table revolves, the manufacturers say. It is also stated that the machine has a short tail swing, permitting operation in close quarters. Zerk-Alemite lubrication is used, and there is an electric starter. The standard equipment engine is a 5½x7 in., 4-cylinder Climax developing 62 hp. Timken roller bearings are used on high-speed shafts.



New full-revolving convertible excavator

New Automatic Spark Control for Heavy-Duty Engines

THE Climax Engineering Co. of Clinton, Iowa, has announced a new automatic spark control for use on its heavy-duty industrial engines. It is claimed that this device operates on an entirely different principal than the conventional centrifgual governor type common in automotive practice. The new spark control operates from the suction in the intake manifold. As the variation in pressure in the intake manifold is proportional to the load imposed upon the engine, the ignition is always timed correctly, no matter how the power varies on intermittent loads, according to the manufacturers. By timing the spark automatically, this new device does what operators could not possibly do by hand, it is claimed. The manufacturers say there is little loss of power and the fuel consumption decreases to a point where a saving of 10% on fuel is attained on intermittent loads, such as are encountered in earth moving machinery, locomotives and similar classes of equipment. Also, it will reduce spark knocks and reduce wear on bearings, it is claimed.

The automatic spark control can be quickly installed in the field on any model Climax engine, the manufacturers say. The small additional cost of installation is claimed to be offset in a few months by the saving it affords in fuel consumption. This new spark control can ge applied by Climax service stations.

San Antonio, Texas, to Have New Cement Plant

SAN ANTONIO will take a record stride in industrial progress within the next few days, when work is started on a cement plant costing approximately $2,000,000 and which will employ several hundred men, Judge J. W. Young, vice-president of Smith Bros. Properties, Inc., announced on May 26. The corporation is among the largest contracting concerns in the United States.

Excavation work will be begun soon on an 800-acre tract of land lying between the Missouri-Kansas-Texas and the Missouri Pacific railroads 10 miles north of the city on the Austin highway, Judge Young said.

The announcement followed the closing of a deal Saturday by which the land was acquired.

It is claimed by Richard K. Meade, Baltimore cement authority, that the corporation has some of the finest raw cement material to be found in the country. He has been here to make an inspection of the site.

A separate corporation will be formed by Judge Young and J. H. Smith, president of the corporation, to operate the plant.

In addition to the plant to house the machinery, a water works, sewer system, with a disposal plant and modern conveniences for the workers will be built, Judge Young said.

This development is described as a move to turn the section toward New Braunfels into an industrial center.

Terrell Bartlett and other prominent San Antonio engineers are making a tour of the United States to gather data on large cement plants before the structure here is started.—*San Antonio* (Tex.) *Express.*

Ohio State Compensation for Limestone Miners Overcome by Bad Air

TWENTY-FIVE MEN employes of the Alpha Portland Cement Co., Ironton, Ohio, who were overcome by smoke and bad air in the mine of the company on June 7, 1926, will receive state compensation for the disability suffered and time lost because of the accident.

On the date in question the miners who reported for duty on Monday morning became ill and fell over immediately on entering the mine. A rescue crew was hastily organized and by efficient work succeeded in getting the entire crew up from the depths of the mine without loss of life, although it was some time before those brought out regained consciousness.

At the time the cause of the trouble was a mystery, as the mine is one of the best ventilated and most thoroughly equipped with safety devices in the country and never in its history had there been any trace of gas or foul air in its workings.

An investigation disclosed that on Sunday, the day before, while the mines were idle, a great quantity of rubbish, consisting of powder boxes, crates and other rubbish, had been burned in the mine. This rubbish fire exhausted the supply of oxygen in the air and the fumes generated did not have time to flow out of the mine before the men reported for duty on Monday morning, and it was this that caused the men to become ill and lose consciousness.

Afterward 25 of the men filed claims with the state industrial commission for compensation and a hearing was held here by a representative of the commission, which has now made public the following finding:

"That the applicants on June 7, 1926, were injured in the course of their employment by being overcome with smoke and bad air;

"That the applicants' employer at the time of the injury was a subscriber to the state insurance fund;

"That the injury was not purposely self inflicted;

"That the commission has jurisdiction of the claims;

"That it was therefore ordered that medical and such other investigations as are necessary be made as to the extent of disability."

As a result of the commission's finding the 25 men will now receive compensation from the state insurance fund for the time lost and disability suffered, the only question remaining to be decided being the extent of their injury.—*Ironton* (Ohio) *Tribune.*

New Directors for Wagner Quarries Co.

THE suit for settlement of differences resulting from the ownership of Wagner Quarries Co., Sandusky, Ohio, was mentioned in the May 12 issue of ROCK PRODUCTS. According to the *Sandusky Star-Journal:*

With the dismissal of the injunction suit, stockholders elected as directors Richard D. Logan and George P. Hahn, Toledo attorneys, and H. E. Bair of Toledo, representing the France interests, and Alex M. Wagner, W. J. Sprow and Clarence E. Wagner, representing the Sandusky interests. R. K. Ramsey was chosen as the seventh director.

The directors at once re-elected Alex M. Wagner president, William J. Sprow vice-president, secretary and general manager, and Clarence E. Wagner treasurer.

Neither officials nor attorneys would make any statement as to possible future developments.

Presumably the Great Northern Stone Co., which took over the Lake Shore Products Co. quarry from the Engineers Bank of Cleveland, also was a France project, but this has not been admitted. It was said, however, that no further development of the quarry was likely this year, if at all.

Florida Portland Cement Co. Expects Big Business

A CHANNEL will be completed about the end of this month from the Ybor estuary channel to the docks of the Florida Portland Cement Co. to permit this new Tampa, Fla., industry to take full advantage of Tampa's port facilities.

The channel is being dredged so ships loaded with coal may be brought direct to the plant and in anticipation of the export of the Tampa product to the West Indies and Central and South American trade, F. M. Traynor, who is in charge of distribution, said recently. When this waterway is completed coal will be brought by the shipload direct from Hampton Roads, Va. The work has been under way more than a month. Material taken from the bottom is being pumped in on the plant site.

A total of 1,421,476 sacks of portland cement has been made in Tampa since the $5,000,000 plant started operation last fall, Mr. Traynor said, and output is increasing.

"We have gone carefully," he added. "Every sack of cement we turned out was of a quality higher than required in United States government specifications. Today the purchasers of cement in Florida realize this.

"When we started first we found skeptics, just as there were men who said they couldn't grow celery at Sanford or potatoes at Hastings. There were architects who had to be convinced and construction executives.

"We now have eight big highway jobs, including two in Gadsden county. We are furnishing all the cement used in the construction of a concrete road in Palm Beach county. We are furnishing cement for all the bridges and culverts on road No. 17 in Hillsborough county. Everything considered, we feel very optimistic," he added.

Mr. Traynor said there were a number of big construction jobs planned for the future, including big road contracts by the state highway department, which probably will be awarded in June. Architects in St. Petersburg and Palm Beach have more on their boards than at any time since the height of the boom. "They have as much as they had during the boom, although your readers probably wouldn't believe it, and I am told that 40 elaborate homes are to be built at Miami Beach this summer," he said. Tampa cement is being used on beautiful homes at Mountain Lake and in construction of the gigantic carillon tower being built by Edward Bok.—*Tampa Tribune.*

New Sand and Gravel Plant at Monroeville, Ala.

THE MONROEVILLE SAND AND GRAVEL CO. of Monroeville, Ala., a newly organized firm, has obtained options on sand and gravel deposits near Monroeville and plans the erection of one or more gravel washing plants.

John G. Munson to Head Michigan Limestone and Chemical Co.

AT a recent meeting of the board of directors of the Michigan Limestone and Chemical Co. of Rogers City, Mich., John G. Munson was elected president of the company to succeed the late Carl D. Bradley. At the same time Mr. Munson was named the president of the Bradley Transportation Co. The vacancy on the board of directors caused by the death of Mr. Bradley has been filled by James A. Farrell, president of the United States Steel Corp. Mr. Munson was vice-president and general manager of both the Michigan Limestone and Chemical Co. and the Bradley Transportation Co. before he was elected to the higher office.

Sandusky Cement Co.'s New Plant at York in Production

THE FIRST CARLOAD of gray cement, a product of the new cement mill of the Sandusky Cement Co., located near the site of the old mill in West York, Penn., was loaded and hauled away May 14. The event was marked by the presence of Mayor Jacob E. Weaver and officials of the Western Maryland Railroad.

Among the officials were Emory Miller, general agent of the Western Maryland Railroad, and E. W. Carlson, construction engineer, who had charge of the erection of the plant, and who is now superintendent of the completed plant.

The new plant, together with facilities for removing the product, represents the expenditure of hundreds of thousands of dollars by the Sandusky company and the Western Maryland Railroad. The new Lincoln yard of the railroad company, over a half-mile long, was constructed primarily because of the demands of the Sandusky company at an estimated cost of $100,000. The yard has a capacity of about 100 cars, and will greatly facilitate the movement of freight shipments from the western end of the city. Eleven tracks have been laid on the property of the Sandusky company.

The new plant is the last word in industrial efficiency. Modern dust-eliminating machinery keeps the plant clean. All machinery and equipment is the latest of its type.

The new plant alone covers about nine acres of ground. The capacity of the mill, in round figures, is 10,000 bags of gray cement per day. Together with the old plant, manufacturing white cement, of high grade, the plant is among the largest in the world.

W. L. White, Jr., general superintendent; J. B. John, president, and E. J. McGuire, secretary-treasurer of the Sandusky company of Cleveland, have taken an active part in bringing the new plant to York, and have made numerous visits here during its construction.—*York* (Penn.) *Dispatch.*

Dominion Trap Rock Corp. to Start Operations June 15

ONE of the most important industrial developments that has occurred in recent years in the territory between Sudbury and Sault Ste. Marie, Ont., will be inaugurated on June 15 by the opening of the Dominion Trap Rock Corp. quarry, formerly known as the Bruce Mines quarry, at Bruce Mines. A. A. MacKay, of Alderon, Mackay and Armstrong, has stated that at the present rate of progress with the installation of machinery the plant should be ready for operation by that date. The capacity of the plant will be 2000 tons of rock per day. The crusher is the largest in Canada. Bruce Mines harbor is being deepened by the dominion government to allow entry of boats into the harbor for shipping the product of the quarry to American cities.

It is understood that the entire output of the quarry for three years has been disposed of.—*Toronto* (Ont.) *Telegram.*

Japanese Cement Manufacturer Studying Quick-Hardening Portland Cement

IN ADDITION to supplying her own cement requirements, Japan produces 2,000,000 tons annually for export, which is disposed of to countries of the Asiatic coast and the South Sea islands, according to K. Wakabayashi of the Asano Cement Co., Tokyo.

Mr. Wakabayashi arrived recently at Seattle, Wash., on the *President Taft* to study the process of making quick-hardening portland cement which is now being produced in this country. He said he was also interested in new methods of transporting cement in bulk as is now being done here.—*Seattle* (Wash.) *Times.*

Plans Progressing for Carolina Cement Co.'s New Mill

THE CAROLINA CEMENT CO., New Bern, N. C., recently formed by J. A. Acker, Port Huron, Mich., identified with New Egyptian Portland Cement Co., has plans nearing completion for a local mill on property acquired about five months ago, to consist of main kiln unit, 110x500 ft.; one-story grinding mill, 100x460 ft.; one-story machine shop, 50x155 ft.; storage and distributing plant, 180x580 ft.; power house with capacity of 5000 k.v.a.; clay wash mill building, 50x60 ft.; 12 raw material storage silos, 25 ft. high and 20 ft. in diameter; packing house, 67x50 ft.; also cement silo storage plant containing 32 bins 16½ ft. in diameter, 80 ft. high; storeroom, 50x80 ft.; main office, 50x50 ft., for an output of about 4000 bbl. per day, to cost close to $2,000,000 with equipment. Samuel E. Flexner is consulting engineer.

Mississippi Flood Prevention Work Revives Quarry Industry

THAT there will be much river improvement work done at Ste. Genevieve, Mo., this summer, is evidenced by the fact that large forces of men have arrived here and are making the necessary preparations to carry out extensive plans. We are told that a new incline will be constructed on the Illinois side of the Mississippi river opposite Little Rock Landing and a large amount of "fences" and riprapping will be constructed on both sides of the river in this vicinity as a part of the new scheme of river improvement and deepening of the channel. Contractors are getting busy to get out and load on barges many thousands of yards of stone from the stone quarry at Little Rock Landing which will also be used in the river improvement work.—*Ste. Genevieve* (Mo.) *Herald.*

The rock quarry owned by Andrew Wilder, of Ste. Genevieve, which is situated just north of Little Rock, is now being opened by a force of workmen so that in the near future rock can be taken out and used on the new Missouri-Illinois incline.

The quarry is one of the largest in the state and has an almost inexhaustible supply of rock suitable for rip-rap work. At one time this quarry employed more men than any other industry in Ste. Genevieve. For the last 25 years it has remained idle.

With a great amount of river improvement work on the program for this summer, the quarries north of Ste. Genevieve will be taxed to capacity to fill the orders they are receiving from the government and from private construction companies who have contracts to let. Before the season is over there is every reason to believe that from three to four hundred men will be at work in these quarries and on the river in the vicinity of Little Rock.

The Arnold quarry is now filling a government contract while the Wilder quarry will be run by a private enterprise.—*Ste. Genevieve* (Mo.) *Fair-Play.*

New York State Gravel Plant Sold at Auction

THE PLANT and 10 acres of land in upper Front street, owned by the bankrupt Stewart Sand and Gravel Corp., Binghamton, N. Y., were sold at public auction recently at the court house to the Livingston County Trust Co. of Geneseo for $19,000 by Referee Ralph L. Emmons. The sale was held under mortgage foreclosure.

Adjoining this tract are around 46 acres of land, containing a heavy sand and gravel deposit, which is in dispute. This is the Rink tract, valued at around $17,000, and is claimed by both the Geneseo bank and the trustee of the bankrupt estate, W. S. Chappelle.—*Binghamton* (N. Y.) *Sun.*

News of All the Industry

Incorporations

Detroit Concrete Products Corp., Detroit, Mich., $30,000.

Exner Sand and Gravel Corp., New York City, $30,000 to $100,000.

Lakeland Silex Brick Co., Lakeland, Fla., $100,000. C. W. Caldwell, A. B. Caldwell.

State Sand and Gravel Co., Indianapolis, Ind., $75,000. H. M. Huff, R. H. Kelly, R. A. Kelly.

Joseph Hendler Stone Quarry and Construction Co., Delaware, $10,000.

Rockwood Gypsum Lumber Corp., New York, 1,000,000, 500,000, 160,000 shares no par; gypsum, cement, lime.

Wisconsin Silica Co., Westfield, Wis., $25,000; deal in silica sand and foundry supplies.

Charles Marmelito Sand and Gravel Co., Maspeth, N. Y., $10,000. J. Friedlander.

Lucasville Sand and Gravel Co., Lucasville, Ohio, $30,000. Mabel Candill, D. H. Harwood, K. M. Long, L. M. Long.

Limestone Calcium Products Co., Limestone, Ohio., 250 shares no par value; A. S. Deringer, W. Lipstraw, W. Weller.

Florida Quarries and Construction Co., West Palm Beach, Fla. C. L. Nelson, Harvey Bldg., and others.

Builders Block, Tile and Supplies, Ltd., Toronto, Can., $40,000; to manufacture and deal in cement, sand, gravel, lime, artificial stone, etc.

Decewville Crushed Stone Co., Ltd., Hamilton, Ont., $100,000; to carry on the business of quarry masters and stone merchants.

Credit Valley Sandstone Quarries, Ltd., Toronto, Canada, $50,000; to quarry and deal in sandstone, limestone, sand and gravel.

Burke-Stone Co., Ltd., Montreal, Canada, $149,000; to manufacture and deal in cement, brick and terra cotta.

Guaranteed Concrete Block Co., Plainfield, N. J., $100,000; concrete products. C. C. Reina, Philadelphia, Penn.

Vienna Sand and Gravel Co., Hawthorne, N. J., $100,000. H. Systerbusch, C. Systerbusch, W. Youngster, A. Youngster, all of Hawthorne.

Ebert Washed Sand and Gravel Co., Washington, Ill., $25,000; general sand and gravel business. M. Ebert, G. W. Ebert, F. L. Blumenshine; correspondent, Clarence W. Heyl, Peoria, Ill.

National Builders Supply Corp., Milwaukee, Wis., 10 shares common stock at $100 each. Deal in sand, gravel, stone, brick, etc.; M. W. Deutsche, F. J. Deutsche, E. J. Deutsche.

Duntile Manufacturing and Supply Co., Allentown, Penn., $20,000. C. D. Fister, Bethlehem, Penn.; C. R. De Long, Philadelphia, Penn., and Cora I. Fry of Allentown.

Broome County Sand and Gravel Corp., Utica, N. Y., $70,000 preferred stock, 1000 shares common stock. Attorneys, Dunmore, Ferris and Dewey, Utica.

Sarnia Cement Products, Ltd., Point Edward, Ont., 2000 shares no par value; to deal in cement, lime and artificial stone. W. D. Reid, Adam E. McDonald and others.

Eastern Hume Concrete Pipe Co., Boston, Mass., $120,000; 1200 shares preferred stock $100 each; 4000 common shares, no par value. Claude A. Palmer, Charles A. Palmer, and R. W. Hall.

Cape Ann Quarries, Inc., Gloucester, Mass., $50,000; 500 shares preferred at $100 each; 400 shares common, no par. Sarah K. Kenney, Sarah A. Corrigan, and Emma Leitiger.

Pioneer Sand Co., Parkersburg, W. Va., $50,000, consisting of 500 shares capital stock $100 par value and 100 shares common stock no par value. W. E. Shivers, R. H. Renshaw, Jr., S. D. Archbold, A. L. Shivers and J. S. McCluer, all of Parkersburg.

Aroostook Traprock Co., Augusta, Me., $100,000. Clarence A. Powers, of Fort Fairfield, is president, and Nathan F. Perry, of Presque Isle, treasurer. The purpose of the company is to open forests and mines for the removal of traprock and other mineral deposits.

Quarries

St. Cloud, Minn. Two new granite quarries are being developed.

Oneida, Wis. The county highway department has opened a new crushing plant.

Republic Marble Quarries, Luttrell, Tenn., has installed a crusher to make commercial crushed stone of scrap marble.

A. S. and H. H. Hathaway, Vreka, Calif., have installed a crushing plant to make agricultural limestone.

Ottawa, Kan. The Missouri Pacific R. R. has put in a spur at Hard Rock, to serve a new crushing plant.

Standard Lime and Stone Co., Belair, Md., recently suffered a serious loss from the breaking of a casting in its primary jaw crusher. The home office of the company is in Baltimore.

National Lime and Stone Co., Findlay, Ohio; the new plant at Akron, Ohio, is for handling stone shipped in, for city distribution and not for production purposes.

Louisville, Ky. The municipal workhouse quarry has been experimenting with blast mats to prevent flying stone during blasting operations. This step was necessary when people of the neighborhood sought to enjoin the quarry from further shooting.

New Jersey Limestone Quarries, Inc., Rudeville, N. J., recently shot its largest blast on a quarry face 150 ft. high and 200 ft. long. The blast was set off by Mr. Hammond of the Atlas Powder Co. and was the second at the quarry. It was declared very successful by W. C. Diggs, the superintendent. Twelve holes filled with 10,000 lb. of dynamite were used. The holes were 85 ft. in depth and were drilled by a well drill, which has been at work for about two months.

Northwestern Limestone Co., Wilson, Wis., is planning to move its offices to Eau Claire in the near future, according to J. D. Young, representative of the company. E. W. Schults is president and manager of the company. G. Erle Ingram, local attorney, is one of the directors. Recently the company opened up a deposit at Burkhardt, near New Richmond, and contemplates enlargement of its business throughout northwestern Wisconsin. Direct sales of limestone to farmers at the plant or delivery by the company trucks will be started here in the near future, it is said.

Sand and Gravel

Moundsville Sand and Gravel Co., Moundsville, W. Va., will erect a new $50,000 plant north of Little Grave creek.

Big Rock Stone and Material Co., Little Rock, Ark., is erecting a $20,000 ready-mixed concrete plant.

Albany, Ore. The county court is erecting a permanent sand and gravel plant north of Shelburn on the Santiam river, to turn out 100 yd. per day.

Little Piney Sand and Gravel Co., Waynesville, Mo.; J. A. Clark has sold his interest to other associates in the company.

Davenport, Iowa. The Scott County board of supervisors has taken an option on gravel property in Princeton township at $400 per acre for farm land and $200 per acre for timber land.

T. L. Herbert & Sons, Nashville, Tenn., have recently purchased the new towboat "Sallie H." for use on the Tennessee river towing the sand barges of the James Sand Co., which the company operates.

Consumers Sand Co., Topeka, Kan., has agreed to remove waste sand from the Kaw river, over which there has been some controversy with local drainage board officials. The company has already begun pumping the sand to a land storage pile.

Cement

Marquette Cement Manufacturing Co., Chicago, will receive bids for the construction of its $1,000,000 additional plant in Oglesby, Ill., during June.

Atlas Portland Cement Co., New York City, is reported to be contemplating development of white clay deposits in the Chestnut Ridge mountains between Kunkletown and Saylorsburg, Penn.

Los Angeles, Calif. The project of Chapin A. Day, president of the Utah-Idaho Cement Co., Ogden, Utah, and associates, to build a new cement plant in the residential section of the city, is meeting with opposition on the part of property owners.

Monolith Portland Midwest Co., Laramie, Wyo., has been denied certain lands necessary to complete its 12-mile railroad from the quarries to the plant at Laramie. The case has been taken to the courts in Laramie county.

Ideal Cement Co., Denver, Colo., has reported a second gas well at its plant at Ada, Okla., producing 5,500,000 cu. ft. of wet gas daily, as well as about 100 bbl. of oil. Another well is being drilled for more gas.

Alpha Portland Cement Co., Birmingham, Ala. Officials of the Morton plant at Birmingham were given a banquet on May 9 by the field sales force. The Morton plant was the Phoenix Portland Cement Co. before the recent merger with the Alpha company. Official welcome was given F. M. Coogan of New York, general sales manager of Alpha.

Cement Products

Western Artificial Stone Works, San Francisco, Calif., has been established by Ray Ruggeri.

Biddle Concrete Co., Clarksburg, W. Va., has been bought out by the Builders Supply and Equipment Co. of Clarksburg.

California Vibrolithic Co., Los Angeles, has changed its name to the Compressed Concrete Co., which better describes its product.

Burton Cast Stone Co., Tampa, Fla., plans to erect an addition to its plant at Rome and Arch streets, Tampa.

Madison Silo Co., Madison, Wis., has purchased a 2½-acre tract and will erect a factory for the manufacture of cement stave silos. J. Ray Trustler is president of the company.

Jamestown Cement Products Co., Jamestown, N. Y., has commenced operations at its new plant in Jamestown. M. H. Webber is head of the company and R. E. Bergman is plant manager.

Duntile Corp., Fall River, Mass., has completed its $25,000 plant and office building and has started operations. The new plant has a capacity of 90,000 units. Mrs. Louise R. Destremps is president of the concern.

Mt. Vernon Building Material Co., Mt. Vernon, Wash., a company recently organized to manufacture concrete products, has purchased a plant site 200x200 ft. and will erect a frame building 30x60 ft. on the property. J. A. Roork is manager of the new concern, which has been incorporated for $7500.

Lime

Western Lime and Cement Co., Milwaukee, Wis.; lime plant at Grimms, Wis., was threatened by fire May 13. Damage was estimated at $6000.

John S. McMillan, president, Roche Harbor Lime Co., Roche Harbor, Wash., was a recent speaker at the 15th province meeting of the Sigma Chi college fraternity, University of Washington.

Miscellaneous Rock Products

Clinchfield Sand and Feldspar Corp., Hearst Tower Bldg., Baltimore, Md., will erect building and install pulverizing machinery at Brookneal, Va.

Cape Silica Co., Cape Girardeau, Mo., may add three or four additional units to its silica mine operated four miles west of Cape Girardeau, according to local reports.

American Feldspar Co., Toughkenamon, Chester County, Penn., is considering rebuilding portion of plant destroyed by fire May 21, with loss reported at $50,000 with equipment.

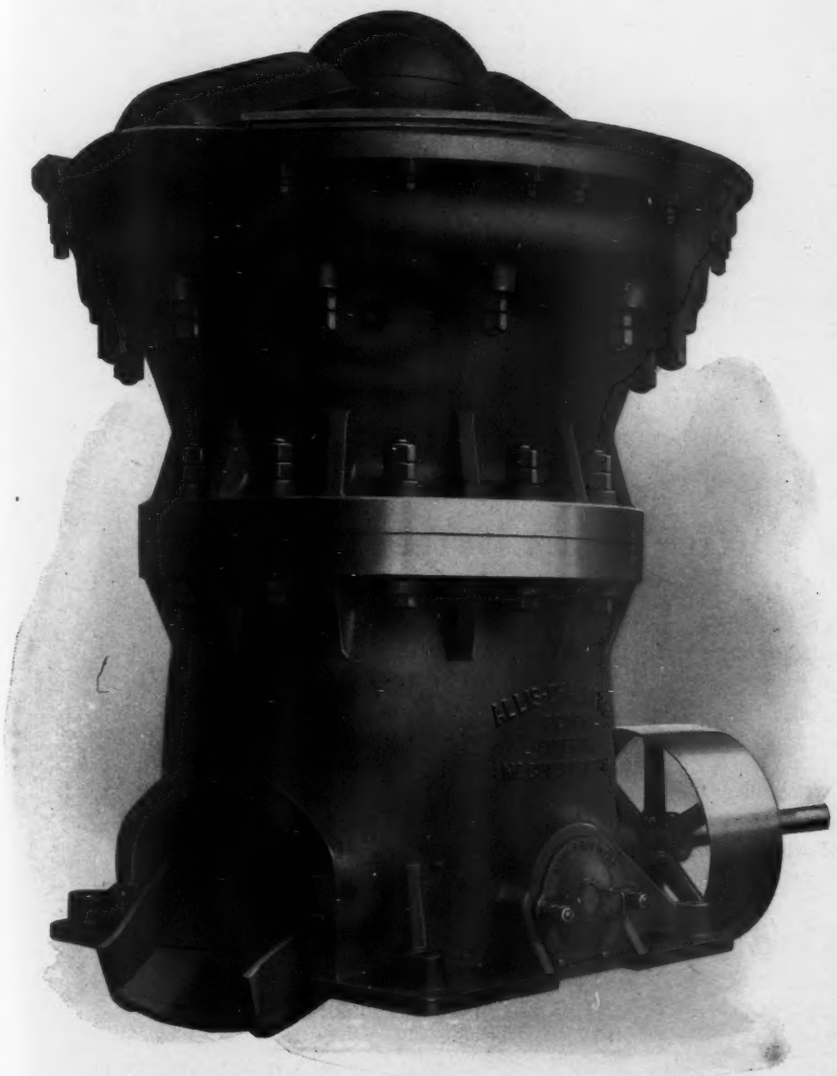
Celite Products Co., 1320 South Hope St., Los Angeles, manufacturer of insulating products, is planning extensions and improvements in plant of National Magnesia Co., Redwood City, Calif., recently secured. Work will consist of new buildings and installation of machinery for mining raw material, refining, etc., to cost approximately $200,000.

Obituaries

Gabriel D. Moore, gravel producer of Danville, Ill., died on May 30 after several months' illness. Mr. Moore, who was 67 years old, is survived by his widow and a son and daughter.

Superior-McCully Crushers

Points of Superiority



Rigid spider hub, due to close coupling of shaft bearings, maintains perfect alignment of bearings and reduces strain on spider.

Eccentric is placed directly below the head. This greatly increases the strength of the shaft; eliminates shaft deflection and consequent breakage and results in greatly increased crushing capacity.

Improved type of dust collar excludes all dirt from the eccentric bearing.

Gear and pinion are of cast steel with cut teeth flooded with oil, insuring smooth operation and long life.

Main frame bored at the factory for all three hands of drive.

Lubrication of eccentric bearings and gears is effected by means of a geared oil pump located in the oil chamber in the bottom plate. This positive pump results in a continuous flow of oil from the pump to the top of the eccentric, and the flooding of the gears with oil.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

GOLFCREST CLUB HOUSE, HOUSTON, TEXAS

J. McLellano, *Architect* T. Tellepsen, *Contractor*

28,000 light weight Ideal concrete building tile furnished by Gulf Concrete Pipe Co.

An Object Lesson for Quarry and Pit Owners

Construction jobs like the above are going to concrete products manufacturers every day — concrete block, brick and tile are enjoying a constantly increasing demand.

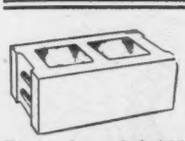
Many crushed stone, sand and gravel operators are becoming interested in local concrete products plants —sometimes as investors, often as sole owners. The two businesses work well together.

We'll gladly tell you what it costs to equip and operate a plant of any desired capacity. Write for complete details.

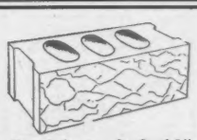
Consolidated
Concrete Machinery Corpn.

UNIVERSAL ANCHOR Adrian Castings

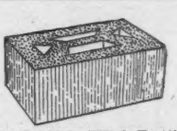
ADRIAN, MICHIGAN



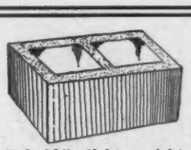
Plain face 8x8x16" block made on hand or power-operated machines of various capacities.



Rock-face 8x8x16" block—we offer a complete line of production units, each making a wide range of sizes.



5x8x12" "High-Test" concrete tile—machines available in three different models of different capacities.



5x8x12" light weight two-core tile, made on three different Consolidated models.

5x12x16" light weight tile made on stripper-type power operated machines.

PER DOLLAR

Extra Explosives applicable to

QUARRYING, MINING AND CONTRACTING OPERATIONS

ONE of the conspicuous accomplishments in the production of economical and efficient explosives is the series of DU PONT EXTRA Dynamites now being made by the du Pont Company.

More powder per dollar is an assured fact to the buyer of these new explosives. In every 50-pound case there are from 115 to 172 cartridges 1¼" x 8"—designated by classes according to the variation in cartridge count to produce the variety of adaptable strengths. With the new explosives available in five classes, it is possible to effect economies in today's blasting operations.

The du Pont Company's DU PONT EXTRA Dynamites

The Alaska-Juneau Gold Mining property, about two and one-half miles east of the city of Juneau.

have been employed in quarrying, open pit coal and ore mining and contracting, and most satisfactory reports have been received concerning economic and efficient performances.

The du Pont trade-mark on each cartridge of these new DU PONT EXTRA Dynamites is a sufficient guarantee of the quality and reliability of these latest developments in the explosives industry.

Increased production obtained at reduced cost makes the profits greater. A step forward toward this accomplishment is to use the particular grade of DU PONT EXTRA DYNAMITE suitable for your quarry, mine operation or engineering project. Our sales representatives or technical men can tell which one of these new, efficient and economical du Pont explosives is most applicable. Your inquiry leads to lower blasting costs, or possibly greater efficiency of your blasting crews.

E. I. DU PONT DE NEMOURS & CO., Inc.

Explosives Department

WILMINGTON, DELAWARE

DU PONT

REG. U.S. PAT. OFF.

One of the big advantages of a Sauerman Scraper is its long reach. Installations with operating spans of 500 to 600 feet are common. They range in size from 10 to 600 cu. yd. capacity per hour.

This picture shows one of the Sauerman Scrapers reclaiming the crushed stone from one of the ground storage piles at the Florida plant back to the loading belt, which handles the material into the cars.

Large Rock Crushing Plant Uses Sauerman Power Drag Scraper to Regulate Production

The Consolidated Rock Products Company, near Brookville, Florida, had a puzzling production problem to solve.

Their rock deposit was a mass of cemented limestone boulders of all sizes, and a great deal of washing was necessary to produce first-class concrete aggregates.

The additional time it required for the elaborate washing process caused no little concern from a production point of view. It had to be offset to take care of peak demands and production had to be regulated by the lowest cost storing methods available.

The company finally turned to Sauerman for a solution, with the result that two 2 Cu. Yd. Sauerman "Crescent" Power Drag Scrapers were installed to handle the storing.

And here's what the company experienced. The initial and installation costs were low, because Sauerman Scrapers are so simple and easy to erect. And the payroll per scraper for storing and reclaiming amounted to the wages of one man—only one man was needed to keep the scraper bucket operating back and forth continuously, taking a heaping load every trip.

As a result, the Sauerman Scrapers stored the ready materials during the slack season and reclaimed from storage to fill the orders during the rush season, fulfilling both of these duties very economically.

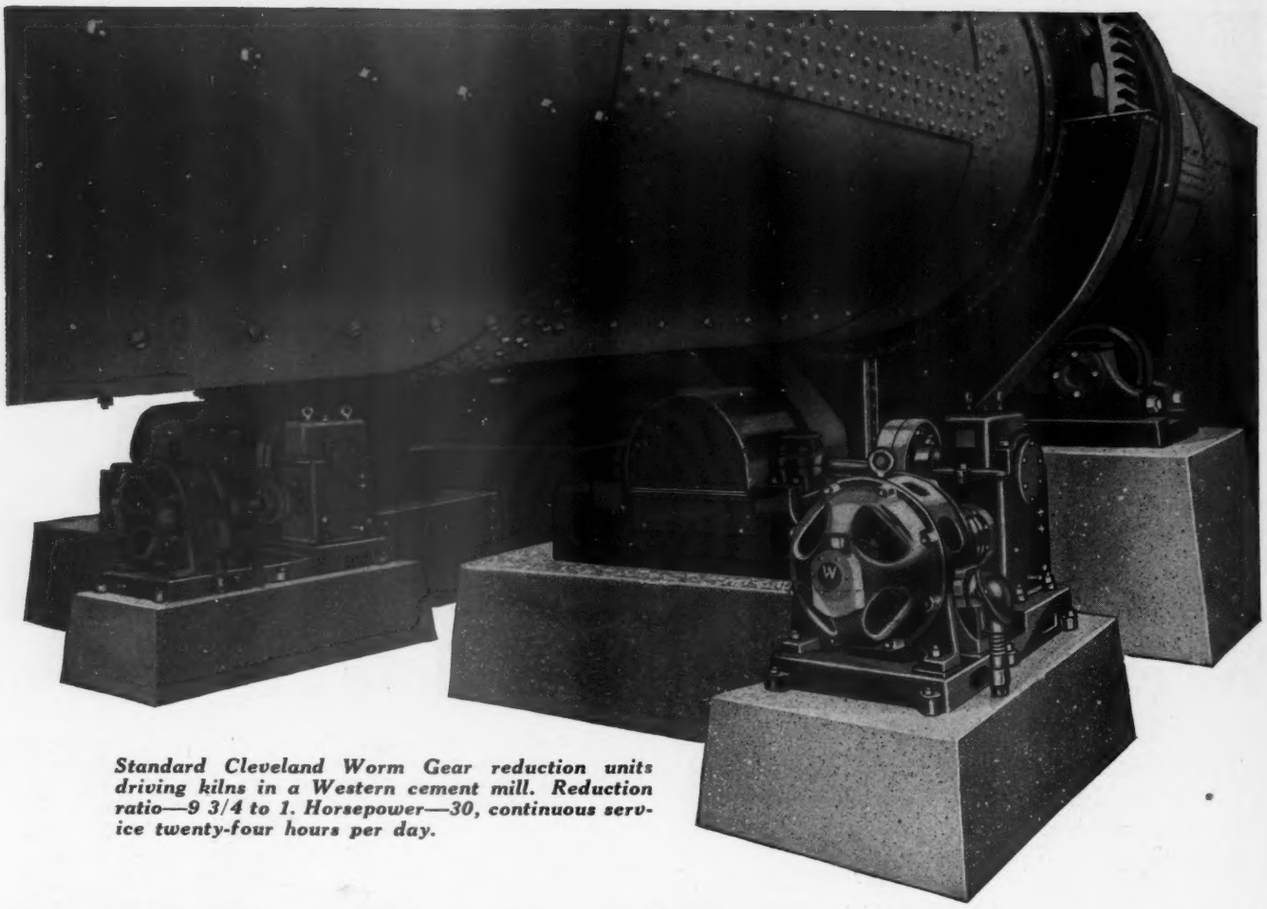
In this way, the company was able to keep the plant running on a profitable production basis, and they always had aggregates on hand when the orders rolled in.

In addition to helping regulate production problems, Sauerman Scrapers are big cost cutters in storing any bulk materials. You'll find page after page of cost cutting information in the new Scraper booklet. Send for a copy. There is no obligation.

SAUERMAN BROS., Inc., 430 S. Clinton St., Chicago

SAUERMAN

POWER SCRAPERS FOR STORAGE



Standard Cleveland Worm Gear reduction units driving kilns in a Western cement mill. Reduction ratio—9 3/4 to 1. Horsepower—30, continuous service twenty-four hours per day.

Standardized Cleveland Drives— Dependable—Efficient—Economical

THE Cleveland drives in service in rock products plants exhibit characteristics which satisfy plant executives and engineers. And this satisfaction is indicated by additional installations of Cleveland worm gear reduction units for plant extensions and improvements.

During the first four months of 1928 a total of 82 Cleveland drives were purchased for rock products plants which were already equipped with Cleveland units. Could there be more convincing testimony regarding the dependability and economy of the standardized Cleveland worm gear reduction unit?

These drives will transmit power to material handling equipment, including screw and belt conveyors, elevators and feeders; kilns and dryers; agitators and screens. The standard Cleveland units fit the requirements of all these installations without the addition of costly, untried special features.

If you are spending any money for inspection, repairs or replacements, it will pay you to investigate the proven economies effected by Cleveland drives. Year after year Cleveland users are adding more Clevelands — the result being low maintenance costs, elimination of production delays, and efficient power transmission. Bulletin 106 describes the Cleveland standardized worm gear drives. Write for a copy.

CLEVELAND WORM & GEAR COMPANY

3272 EAST 80th STREET **CLEVELAND, OHIO**

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 160

Acetylene Generating Apparatus
Oxweld Acetylene Co.
Air Reduction Sales Co.

Acetylene (Dissolved)
Air Reduction Sales Co.

Aerial Wire Rope Tramways
American Steel & Wire Co.
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.

Agitators, Thickeners and Slurry Mixers
The Dorr Co.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Morris Machine Works
Polysius Corp.
F. L. Smidth & Co.

Air Compressors
Chicago Pneumatic Tool Co.
Pennsylvania Pump & Compressor Co.
Sullivan Machinery Co.
Traylor Eng. & Mfg. Co.

Air Filters
Dust Recovering & Conv. Co.

Air Line Oilers
Gardner-Denver Co.

Air Pumps
Fuller Lehigh Co.

Air Separators
Dust Recovering & Conv. Co.
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New Haven Sand Blast Co.
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Hayward Co.

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Merrick Scale Mfg. Co.

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Bemis Bro. Bag Co.
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Bag Trucks
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Blasting Powder
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Komnick Machy. Co.

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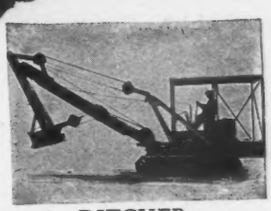
INSLEY

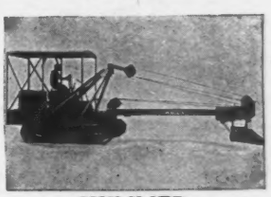
SHOVEL — Ditcher — Skimmer — Dragline — CRANE

An Insley Shovel operated by an electric motor owned by the Medora Brick Co., Medora, Ind.

Earning Capacity On All Sorts of Work



DITCHER



SKIMMER

CRANE

ROCK, shale, gravel or sand—it's all the same to the Insley Shovel. Its sturdy construction enables it to stand up under the punishment it encounters on any kind of digging or material handling job. Its rugged power develops a cutting pressure per lineal inch on the lip of the bucket which is second to none. And its operating speed is the factor which has lowered costs in many a quarry and gravel pit, as well as on many a road job.

The Insley has features of design and construction which are unsurpassed. These features mean continuous uninterrupted economy on your work, month after month, season after season.

The Insley is made not only as a Shovel for grading and material handling, but as a Ditcher for trenching, a Skimmer for light grading, a Dragline for ditching and stripping, and as a Crane for charging bins, handling a pile hammer, and a dozen other jobs. As an all round machine the Insley is without an equal.

Investigate the Insley now, and you will recognize its possibilities.

620

INSLEY MANUFACTURING COMPANY - Indianapolis

Engineers and Manufacturers

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Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 160

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Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Manganese Steel Forge Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Sturtevant Mill Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.
Webster Mfg. Co.
F. M. Welch Eng. Serv.

Coolers (See Kilns and Coolers, Rotary)

Core Drilling (See Drills—Diamond Core)

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Fons Flexible Pipe Coupling Co.
Philadelphia Gear Works

Couplings (Hose, Pipe, etc.)
Chicago Pneumatic Tool Co.
Fons Flexible Pipe Coupling Co.
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

Cranes (Crawler and Locomotive)
Atlas Car & Mfg. Co.
Browning Crane Co.
Bucyrus-Erie Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Industrial Brownhoist Corp.
Insley Mfg. Co.
Koehring Co.
Link-Belt Co.
Ohio Locomotive Crane Co.
Thew Shovel Co. (Electric, Gasoline & Steam

Cranes (Gantry)
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.

Cranes (Overhead, Traveling, Electric, etc.)
Harnischfeger Corp. (Pawling & Harnischfeger)

Crushers (Hammer)
Dixie Machinery Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin Mfg. Co.
Butterworth & Lowe
Lewistown Fdy. & Mach. Co.
Polysius Corporation
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

Crushers (Rotary)
Butterworth & Lowe
J. B. Ehrsam & Sons Mfg. Co.
Polysius Corporation

Crushers (Single Roll)
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan-Stone Machine Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Polysius Corporation
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.

Cutter Heads
Hetherington & Berner, Inc.

Cutting Apparatus
Haynes Stellite Co.
Oxweld Acetylene Co.

Decarbonizing Apparatus
Air Reduction Sales Co.

Derricks and Derrick Fittings
S. Flory Mfg. Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.
Mundy Sales Corp.
Street Bros. Machine Wks.
G. H. Williams Co.

Detonators
E. I. du Pont de Nemours & Co.
Hercules Powder Co.

Dewatering Machines
Chicago Pneumatic Tool Co.
The Dorr Co.

Diamond Core Drilling (See Drills, Diamond Core)

Diesel Engines (See Engines, Diesel)

Dippers and Teeth (Steam Shovel)
Bucyrus-Erie Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.
Thew Shovel Co. (Steam Shovel)

Ditchers
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.
Insley Mfg. Co.

Draglines
Bucyrus-Erie Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Insley Mfg. Co.
Koehring Co.
Link-Belt Co.
Monighan Mfg. Corp.
Thew Shovel Co.

Dragline Excavators
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.
Monighan Mfg. Corp.
Thew Shovel Co. (Electric, Gasoline & Steam)

Dragline Cableway Excavators
R. H. Beaumont Co.
Browning Crane Co.
Bucyrus-Erie Co.
Link-Belt Co.
Mundy Sales Corp.
Sauerman Bros.
Street Bros. Mach. Wks.

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Dredge Pipe (See Pipe)

Dredges
Bucyrus-Erie Co.
S. Flory Mfg. Co.
Hayward Co.
Hetherington & Berner, Inc.
Morris Machine Works
Mundy Sales Corp.
F. M. Welch Eng. Serv.

Drill Sharpening Machines
Armstrong Mfg. Co.—Well Drill Bits
Gardner-Denver Co.
Sullivan Machinery Co.

Drill Steel
Bethlehem Steel Co.
Chicago Pneumatic Tool Co.
Gardner-Denver Co.

Drilling Accessories
Gardner-Denver Co.
Loomis Machine Co.

Drills (Blast Hole)
Armstrong Mfg. Co.
Loomis Machine Co.

Drills (Diamond Core)
Sullivan Machinery Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Chicago Pneumatic Tool Co.
Gardner-Denver Co.
Sullivan Machinery Co.

Drills, Well (See Drills, Blast Hole)

Drives (See Gears, Chain Drives, etc.)

Drives (Short Center)
Link-Belt Co.

Drives (Worm)
Cleveland Worm & Gear Co.

Dryers
Allis-Chalmers Mfg. Co.
Bonnot Co.
Fuller Lehigh Co.
Lewistown Fdy. & Mach. Co.
McGann Mfg. Co., Inc.
Raymond Bros. Impact Pulv. Co.
Ruggles-Coles Div. of Hardinge Co., Inc.
Traylor Eng. & Mfg. Co.

Dust Arresters
Dust Recovering & Conv. Co.
New Haven Sand Blast Co.
Northern Blower Co.
Pangborn Corp.
W. W. Sly Mfg. Co.

Dust Blowers
Dust Recovering & Conv. Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Dust Recover'g & Conveying Co.
New Haven Sand Blast Co.
Pangborn Corp.
W. W. Sly Mfg. Co.

Dust Conveying Systems
Dust Recovering & Conveying Co.
Fuller Co.

Dynamite
E. I. du Pont de Nemours & Co.
Hercules Powder Co.

Electric Drills (Portable)
Chicago Pneumatic Tool Co.

Electric Haulage Systems
Westinghouse Elec. & Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Elevator Belting (See Belting)

Elevator Buckets (See Buckets—Elevator)

Elevators (See Conveyors and Elevators)

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Engineers
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Burrell Eng. & Const. Co.
The Dorr Co.
Dust Recover'g & Conveying Co.
H. K. Ferguson Co.
Fuller Lehigh Co.
Hetherington & Berner, Inc.
Robt. W. Hunt Co.
Kritzer Co.
H. Miscamphell
F. L. Smidth & Co.
Sturtevant Mill Co.
Webster Mfg. Co.
F. M. Welch Eng. Serv.
R. D. Wood & Co.

Engine Governors
Pierce Governor Co.

Engines (Diesel)
Bethlehem Steel Co.
Chicago Pneumatic Tool Co.
Power Mfg. Co.

Engines (Gasoline, Kerosene and Oil)
Climax Engineering Co.
Hercules Motors Corp.
Le Roi Company
Mundy Sales Corp.
Power Mfg. Co.
Wisconsin Motor Mfg. Co.

Engines (Steam)
Morris Machine Works
Mundy Sales Corp.

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Explosives
Air Reduction Sales Co.
E. I. du Pont de Nemours & Co.
Hercules Powder Co.
Keith Dunham Co.

Fans
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Fans (Exhaust)
Jeffrey Mfg. Co.
New Haven Sand Blast Co.
W. W. Sly Mfg. Co.

Feeders
Robins Conveying Belt Co.

Filters (Air)
Dust Recovering & Conv. Co.

Fire Brick
General Refractories Co.

Flux
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Forges (Oil for Drill Steel)
Gardner-Denver Co.

Forgings
Davenport Loco. & Mfg. Co.
Manganese Steel Forge Co.

Frogs and Switches
Atlas Car & Mfg. Co.
Bethlehem Steel Co.
Easton Car & Construction Co.
L. B. Foster Co.
Westinghouse Elec. & Mfg. Co.

Furnaces
Raymond Bros. Impact Pulv. Co.
Sullivan Machinery Co.

Fuses (Electrical)
E. I. du Pont de Nemours & Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gaskets
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

Gasoline Engines—(See Engines, Gasoline, Kerosene and Oil)

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Gas Producers
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Gauges
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Gears (Spur, Helical, Worm)
Cleveland Worm & Gear Co.
Jeffrey Mfg. Co.
R. D. Nuttall Co.
Palmer-Bee Co.
Philadelphia Gear Works
Webster Mfg. Co.

Gears and Pinions
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General Elec. Co.
Morse Chain Co.
Philadelphia Gear Works
Stephens-Adamson Mfg. Co.
Vulcan Iron Works
Webster Mfg. Co.

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Oxweld Acetylene Co.

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Grab Bucket Cranes (See Cranes)

Grab Bucket Hoists (Monorail) (See Cranes)

Grab Buckets—See Buckets (Grab, Clamshell, etc.)

Graphite Facings
Joseph Dixon Crucible Co.

Grapples
Hayward Co.

Grapples (Stone)
G. H. Williams Co.

Grapples (Wood)
Browning Crane Co.

Grating
Blaw-Knox Co.
Kerlow Steel Flooring Co.

Grease
Adam Cook's Sons, Inc.
Joseph Dixon Crucible Co.
Merco Nordstrom Valve Co. (Valve)
Troco Lubricating Co.

Grinding Balls
Fuller Lehigh Co.
Jeffrey Mfg. Co.

Grizzlies
Austin Manufacturing Co.
Eagle Iron Works
Lewistown Fdy. & Mach. Co.
Manganese Steel Forge Co.
Robins Conveying Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Webster Mfg. Co.

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Georgia Iron Works

Gypsum Plaster Plants
Butterworth & Lowe
J. B. Ehrsam & Sons Mfg. Co.

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Hammer Drills
Chicago Pneumatic Tool Co.
Gardner-Denver Co.

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Hand Shovels (See Shovels)

Heaters
Westinghouse Elec. & Mfg. Co.

Hoists
Chicago Pneumatic Tool Co.
S. Flory Mfg. Co. (Electric, Steam and Gasoline)
Gardner-Denver Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.
Link-Belt Co.
Mundy Sales Corp.
Sauerman Bros.
Smith Engineering Works
Street Bros. Mach. Wks.
Sullivan Machinery Co. (Portable Air, Electric and Steam)
Vulcan Iron Works
Webster Mfg. Co.

Hoppers and Spouts
Manganese Steel Forge Co.

Hose Couplings (See Couplings)

Hose (Water, Steam, Pneumatic and Air Drill)
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

Hose (Welding)
Oxweld Acetylene Co.

Hydrators (Lime)
Jackson & Church Co.
Kritzer Co.
McGann Mfg. Co., Inc.
H. Miscampbell

Hydraulic Guns (See Guns, Hydraulic)

Insulation (Electric)
General Electric Co.

Insulation (Heat)
General Refractories Co.

Kiln Insulation
General Refractories Co.

Kiln Liners
General Refractories Co.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Bonnot Co.
Hardinge Co., Inc.
McGann Mfg. Co., Inc.
Polysius Corporation
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Vulcan Iron Works

Kilns (Shaft)
McGann Mfg. Co., Inc.
H. Miscampbell
Vulcan Iron Works

Kominuters (See Mills)

Laboratory Crushers
Sturtevant Mill Co.

Lead Burning Apparatus
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Lights (Portable Acetylene)
Oxweld Acetylene Co.

Lime Handling Equipment
Dust Recovering & Conv. Co.
Fuller Co.
Kritzer Co.
Link-Belt Co.
H. Miscampbell
Raymond Bros. Impact Pulv. Co.
Webster Mfg. Co.

Lime and Hydrating Plants
McGann Mfg. Co., Inc.
Vulcan Iron Works

Line Shaft Couplings
Chain Belt Co.
Philadelphia Gear Works

Linings (See Mill Liners & Linings)

Linings (Rubber for Ball and Tube Mills)
B. F. Goodrich Rubber Co.

Liquid Oxygen
Air Reduction Sales Co.
Keith Dunham Co.

Loaders and Unloaders
Bucyrus-Erie Co.
Consolidated Concrete Machinery Corp.
Dust Recovering & Conv. Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.

Loaders and Unloaders (Continued)
Jeffrey Mfg. Co.
Link-Belt Co.
Webster Mfg. Co.
G. H. Williams Co.

Locomotive Cranes (See Cranes)

Locomotives (Steam, Gas and Electric)
Davenport Loco. & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Works (Steam)
Vulcan Iron Works
Westinghouse Elec. & Mfg. Co.

Locomotives (Storage Battery)
Atlas Car & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Lubricants
Broderick & Bascom Rope Co. (Wire Rope)
Adam Cook's Sons, Inc.
Joseph Dixon Crucible Co.
Merco Nordstrom Valve Co. (Valve)
Troco Lubricating Co.
Vacuum Oil Co.

Machinery Guards
Harrington & King Perforating Co.

Magnetic Pulleys
Magnetic Mfg. Co.

Magnetos
Eisemann Magneto Corp.

Magnets
General Electric Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

Manganese Steel (Rolled or Forged)
Manganese Steel Forge Co.

Mechanical Rubber Goods
B. F. Goodrich Rubber Co.

Metal (Alloys, See Alloys, Babbitt Metal, Manganese Steel, Steel, etc.)

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
Bethlehem Steel Co.
Bonnot Co.
Bradley Pulverizer Co.
Fuller Lehigh Co.
Hardinge Co., Inc.
Jackson & Church Co.
Lewistown Fdy. & Mach. Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Fuller Lehigh Co.
Jeffrey Mfg. Co.
F. L. Smidth & Co.

Mill Lining (Rubber for Ball and Tube Mills)
B. F. Goodrich Rubber Co.

Mining Engineers (See Engineers)

Molds (Concrete)
Consolidated Concrete Machinery Corp.

Motors (Gasoline)
Climax Engineering Co.
Le Roi Company

Motors and Generators (Electric)
Allis-Chalmers Mfg. Co.
General Electric Co.
Haynes Stellite Co.
Westinghouse Elec. & Mfg. Co.

Oil Burning Apparatus
Chicago Pneumatic Tool Co.
Raymond Bros. Impact Pulv. Co.

Oilers (Air Line)
Gardner-Denver Co.

Oil Forges
Gardner-Denver Co.

Oils (Lubricating)
Vacuum Oil Co.

Ore Jigs
McLanahan-Stone Machine Co.

Oxy-Acetylene Apparatus
Air Reduction Sales Co.
Haynes Stellite Co.
Oxweld Acetylene Co.

Oxygen Gas
Air Reduction Sales Co.

Oxygen, Liquid (See Liquid Oxygen)

Packings (Pump, Valve, etc.)
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

Paint
Joseph Dixon Crucible Co.

Pavers
Koehring Co.

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
W. Toepfer & Sons Co.

Pile Drivers
Browning Crane Co.
Bucyrus-Erie Co.
Harnischfeger Corp. (Pawling & Harnischfeger)

Pins and Bushings (Forged Manganese Steel)
Manganese Steel Forge Co.

Pipe
L. B. Foster Co.
Manganese Steel Forge Co. (Rolled Manganese Dredge Pipe)
R. D. Wood & Co.

Pipe Flanges
Georgia Iron Works

Plates (Steel)
Blaw-Knox Co.

Plug Valves (See Valves)

Pneumatic Drills (See Drills)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
Austin Manufacturing Co.
Fuller Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Portable Engines
Climax Engineering Co.
Le Roi Company

Portable Loaders
Jeffrey Mfg. Co.

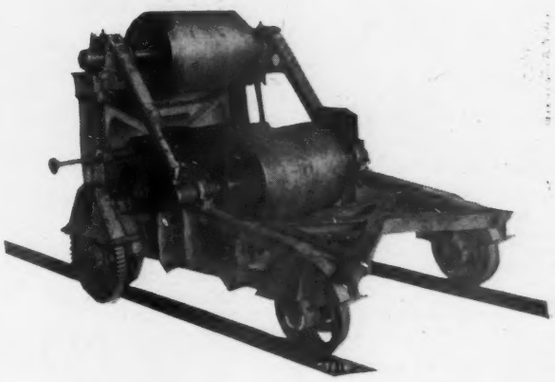
Powder (Blasting)
E. I. du Pont de Nemours & Co.
Hercules Powder Co.

Power Units
Climax Engineering Co.
Hercules Motors Corp.
Le Roi Company
Power Mfg. Co.
Wisconsin Motor Mfg. Co.

Pulleys (Friction Clutch)
Power Mfg. Co.
Webster Mfg. Co.

For Economic Storage

of moderate tonnages



a little ground space
a short trestle
idlers
belt
and —— The Robins Type K Tripper

Robins has available a complete line of trippers ranging from the full automatic Type S for wide belts, high speeds and heavy tonnages down to the Types K and KH just mentioned. Robins engineers can adequately equip any storage or distributing system requiring trippers.

SMALL storage systems very often come in mighty handy.

And where it seems best to install a short conveyor trestle over the ground space and "trip" the stone to storage, Robins can furnish this tripper, inexpensive yet very serviceable for light duty.

Type K is self (belt) propelled but hand controlled. Or there is the Type KH which is hand propelled as well as hand controlled. Each comes in sizes to fit belt widths varying between 14″ and 24″.

Our nearest office will be glad to give further information regarding these trippers. Or, if you desire, we will lay out and furnish the equipment for the complete storage system.

ROBINS CONVEYING BELT COMPANY
15 Park Row, New York City
Chicago Boston Philadelphia Pittsburgh Los Angeles
Agents in Other Principal Cities

Conveying and Elevating Equipment
Sizing and Screening Equipment
Stocking and Reclaiming Systems

MATERIAL HANDLING ROBINS EQUIPMENT

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Dixie Machinery Mfg. Co.
Fuller Lehigh Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Kent Mill Co.
Lewistown Fdy. & Mach. Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Universal Crusher Co.

Pumps (Air Lift)
Chicago Pneumatic Tool Co.
Fuller Co.
Pennsylvania Pump & Compressor Co.
Sullivan Machinery Co.

Pumps (Cement Slurry)
The Dorr Co.
Fuller Co.
Morris Machine Works
Polysius Corporation
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
Bethlehem Steel Co.
Chicago Pneumatic Tool Co.
Hetherington & Berner, Inc.
Morris Machine Works
Pennsylvania Pump & Compressor Co.
A. R. Wilfley & Sons

Pumps (Pulverized Fuel)
Fuller Lehigh Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
Georgia Iron Works
Hetherington & Berner, Inc.
Morris Machine Works
A. R. Wilfley & Sons

Rails
Bethlehem Steel Co.
Easton Car & Construction Co.
L. B. Foster Co.

Railways (Electric)
General Electric Co.

Railway Equipment
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Refractories
General Refractories Co.

Regulators (Welding & Compressed Gas)
Oxweld Acetylene Co.

Road Machinery
Austin Manufacturing Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
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Harnischfeger Corp. (Pawling & Harnischfeger)
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Austin Mfg. Co.
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Street Bros. Mach. Wks.

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Gardner-Denver Co.

Screens
Allis-Chalmers Mfg. Co.
Austin Mfg. Co.
Chain Belt Co.
Chicago Perforating Co.
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Cross Engineering Co.
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W. Toepfer & Sons Co.
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Universal Crusher Co.
Universal Vibrating Screen Co.
F. M. Welch Eng. Service

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Separators (Slurry)
F. L. Smidth & Co.

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Bucyrus-Erie Co.
General Excavator Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Industrial Brownhoist Corp.
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Koehring Co.
Link-Belt Co.
Monighan Mfg. Corp.
Thew Shovel Co. (Crawler Tractor)

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Burrell Eng. & Constr. Co.
F. L. Smidth & Co.

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R. H. Beaumont Co.
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Stephens-Adamson Mfg. Co.
Street Bros. Mach. Wks.
F. M. Welch Eng. Service.

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American Cable Co.
A. Leschen & Sons Rope Co.

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Sprockets and Chain
Chain Belt Co.
Fuller Lehigh Co.
Jeffrey Mfg. Co.
Morse Chain Co.
Philadelphia Gear Works

Steel (Special Alloy)
Bethlehem Steel Co.
Haynes Stellite Co.

Steel Fabrication
H. K. Ferguson Co.

Steel Plate Construction
Hendrick Mfg. Co.

Steel (Structural)
Bethlehem Steel Co.

Stellite
Haynes Stellite Co.

Steps (Safety)
Kerlow Steel Flooring Co.

Stokers
Raymond Bros. Impact Pulv. Co.

Storage Equipment
R. H. Beaumont Co.
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Chicago Pneumatic Tool Co.
Consolidated Concrete Machinery Corp.

Tanks
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The Dorr Co.
Link-Belt Co.
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The Dorr Co.
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Tile (Concrete) Machinery
Consolidated Concrete Machinery Corp.

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Bethlehem Steel Co.
Haynes Stellite Co.

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Torches (Cutting & Welding)
Haynes Stellite Co.
Oxweld Acetylene Co.

Track Equipment
Atlas Car & Mfg. Co.
Bethlehem Steel Co.
Easton Car & Construction Co.
L. B. Foster Co.

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Caterpillar Tractor Co.

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Broderick & Bascom Rope Co.
Interstate Equipment Corp.

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B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

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Allis-Chalmers Mfg. Co.
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Tube Mill Liners (See Mill Liners)

Tubing (Blasting)
B. F. Goodrich Rubber Co.

Tunnelling Machines
Bucyrus-Erie Co.
Harnischfeger Corp. (Pawling & Harnischfeger)

Turbines
Westinghouse Elec. & Mfg. Co.

Turntables
Easton Car & Construction Co.

Underground Loaders
Bucyrus-Erie Co.
Thew Shovel Co.

Valves
Haynes Stellite Co.
Merco Nordstrom Valve Co. (Lubricated Plug)
Oxweld Acetylene Co.

Valves (Pump)
B. F. Goodrich Rubber Co.

Vibrating Screens (See Screens)

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
The Dorr Co.
Eagle Iron Works
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan-Stone Mach. Co.
F. L. Smidth & Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
F. M. Welch Eng. Service

Weighing Equipment
Merrick Scale Mfg. Co. (Automatic Proportioning)
Schaffer Poidometer Co.

Welding and Cutting Apparatus
General Electric Co.
Haynes Stellite Co.
Oxweld Acetylene Co.
Westinghouse Elec. & Mfg. Co.

Well Drills (See Drills, Well)

Wheels (Car)
Eagle Iron Works
Easton Car & Construction Co.
Fuller Lehigh Co.
Vulcan Iron Works

Winches and Capstans
Mundy Sales Corp.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
Manganese Steel Forge Co.
W. S. Tyler Co.

Wire (Manganese Steel)
Manganese Steel Forge Co.

Wire (Welding)
Air Reduction Sales Co.
Haynes Stellite Co.

Wire Rope
American Cable Co.
American Steel & Wire Co.
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.

Wire Rope Fittings
American Cable Co.
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.

Wire Rope Slings
American Cable Co.

Worm Gears (See Gears)

NO PRODUCTION DELAYS with Vulcan on the Job!

ON the majority of material handling operations the efficiency of the haulage equipment is a most important factor in maintaining the production schedule. Here, of all places, reliability is a thing to insist upon—because when the raw material ceases to flow into the plant production costs immediately climb.

Insure against serious production delays with Vulcan Locomotives. Many operators are finding it the best way.

VULCAN IRON WORKS OF Wilkes-Barre, Pa. U.S.A.

STEAM GASOLINE ELECTRIC **LOCOMOTIVES**

We also manufacture gasoline and electric locomotives.

New York Office
50 Church St.

Chicago Office
McCormick Bldg.

Grind FINER ~ CHEAPER with the *Hercules!*

IN the manufacture of superfine cement, DOUBLE STAGE REDUCTION has proven the only satisfactory method of grinding the cement rock and clinker to the required fineness.

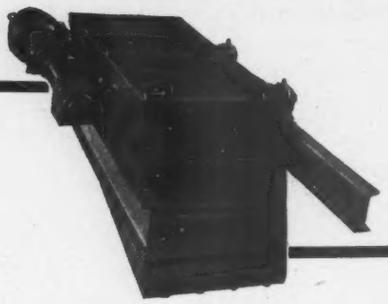
BRADLEY HERCULES MILLS followed by Tube Mills will produce the desired results with less cost for power than any other combination of grinding mills. Learn the details about the Hercules!

For grinding agricultural limestone, asphalt filler, coal, gypsum and all other non-metallic mineral, investigate the
GRIFFIN MILL,
BRADLEY THREE-ROLL MILL AND
BRADLEY PNEUMATIC MILL—
all of which are widely used for these purposes.

BRADLEY PULVERIZER COMPANY
BOSTON — LONDON
WORKS: ALLENTOWN, PA.

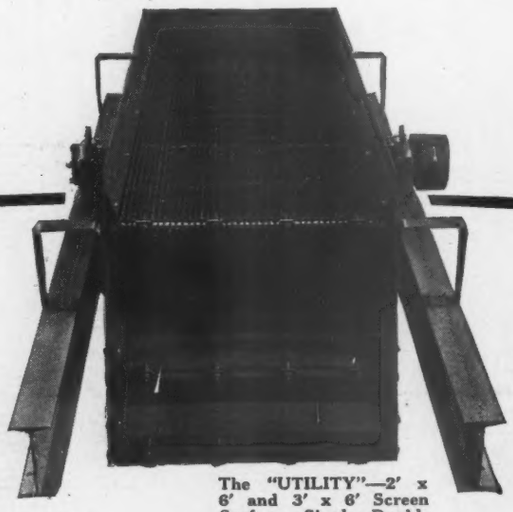
When writing advertisers, please mention ROCK PRODUCTS

Simplicity Vibrators



NO matter what the nature of your operation—be it pit, bank or quarry—Simplicity Vibrators are designed to meet your every need to the letter. Whether your material is wet, damp or dry makes no difference either, because the design of these screen units is such as to make them equally adaptable and highly efficient regardless of the condition of the material.

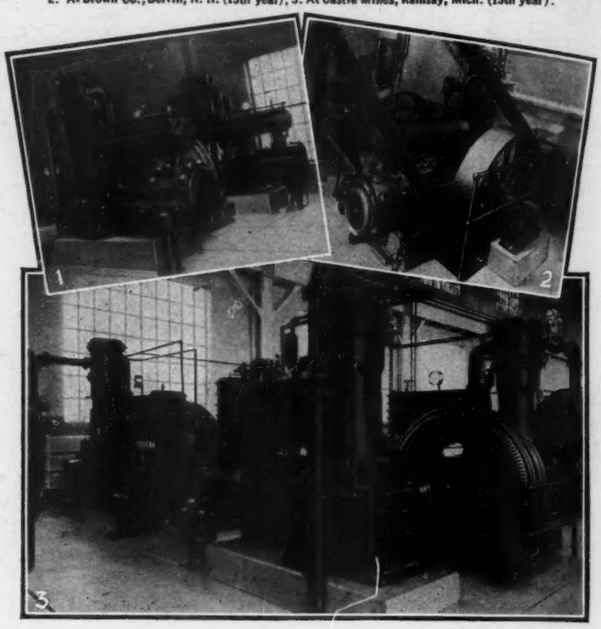
SIMPLICITY VIBRATORS are sturdy, capable units—built to take care of the most difficult screening operation with highest possible efficiency. There's a Simplicity—either the "UTILITY" or "SUPER"—exactly suited to meet your specific needs.



The "UTILITY"—2' x 6' and 3' x 6' Screen Surface. Single, Double and Triple Deck.

SIMPLICITY ENGINEERING CO.
DURAND, MICH.

The Pictures: 1. Sullivan Angle Compounds in operation at French and Hecht, Davenport, Iowa (13th year); 2. At Brown Co., Berlin, N. H. (15th year); 3. At Castle Mines, Ramsay, Mich. (13th year).



"How Long *Do* Angle Compounds Last?"

"Say, Riley, the cost department wants to know how to charge off our new Angle Compound Compressor. How long can we expect economical service from Angle Compounds?"

"How long? I can't tell you, Mr. Brown. You see, Angle Compounds have only been in use fifteen years—not long enough to wear one out.

"Last week, at the Brown Company, I saw two Angle Compounds installed fifteen years ago, running right alongside three others that have been installed since.

THE STORY SO FAR—Supt. Riley and Gen. Mgr. Brown installed an Angle Compound Air Compressor. Power costs immediately went down; Riley explained how this was due to Multi-step load control. Now they're deciding how to write off the cost of the Angle Compound.

"And at scores of other places, Angle Compounds have been running for more than twelve years."

"But, Riley, how can these compressors supply air power as economically as equipment ten or fifteen years newer? Isn't that unusual?"

"Sure it's unusual—but so are Angle Compounds. They've kept step with modern improvements, of course, but in 15 years no other compressor design has been developed that equals Balanced Angle Design."

Long, efficient service is only one of the Angle Compound economy features. *Send for Catalog 83-J.*

BALANCED ANGLE COMPOUND — SULLIVAN

For Lowest Possible Cost Per Unit of Air Compressed

Sullivan Machinery Company
82 E. Adams St., Chicago

SULLIVAN TRADE MARK

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED — POSITIONS VACANT
Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

FOR SALE

1—75 H.P. Electric Stripping Outfit.
1—Gas Portable Core Drill.
1—No. 3 Gates Gyratory Crusher with Screens.
1—No. 9-K Gates Gyratory Crusher.
2—No. 8-D Gates Gyratory Crushers.
1—No. 5 Telsmith Gyratory Crusher.
1—No. 7 Williams Fine Grinder.
1—No. 7½-D Gates Gyratory Crusher.
1—18"x36" Farrell Jaw Crusher.
1—36"x48" Traylor Bull Dog Crusher.
1—No. 6 Austin Gyratory Crusher.
2—No. 5-K Gates Crushers.
1—Complete 400 Yard Gravel Plant.
1—Complete Small Stucco Plant.
1—6'x22" Hardinge Conical Ball Mill.
1—41-ton Baldwin Standard Gauge Locomotive.
2—Complete ¾-yd. Gas Cableway Outfits; 1 steam.
1—Sauerman 1-yd. Outfit, without power.
1—Sauerman 2-yd. Electric Outfit, complete.
1—New 200 H.P. G. E. Motor.
1—65' Center Bucket Elevator.
50—Steam and Electric Channelers.
1—33" Fuller Mill.
1—3'x30' Indirect Fired Dryer.
1—42" Gas Whitcomb Locomotive.
1—150' Matthew Gravity Conveyor.

Send us your inquiries and we will send you our offerings from our $15,000,000 Listing.

National Equipment Company
Bloomington, Indiana

Before Buying or Selling
RAILS
Equipment
Steel Piling
Tanks
Pipe—
Get
ZELNICKER'S BULLETIN
Oil
Engines
Boilers and
Engines; Hoists
and Shovels, Cranes
Draglines
ZELNICKER IN ST. LOUIS

UNIVERSAL CRUSHER COMPANY
Eastern Agents
All Steel Jaw Crushers. Also used equipment in crushing and power lines.
HOOPER-MOMBERGER CO.
90 West St., New York City Phone Rector 2919

REBUILT LOCOMOTIVES

72-ton American 6-wheel switcher, separate tender, 180 lb. steam. Eight duplicates.
54-ton Baldwin 6-wheel switcher, separate tender, 200 lb. steam; built 1913.
50-ton Baldwin 6-wheel switcher, separate tender; built 1907.
43-ton Baldwin 6-wheel switcher, separate tender, 180 lb. steam; built 1917.
35-ton Baldwin 4-wheel switcher, separate tender, 180 lb. steam; built 1921.
42-ton American 4-wheel saddle tank, 180 lb. steam; built 1910; Ohio boiler.
31-ton Baldwin 4-wheel saddle tank, 160 lb. steam; built 1914.
21-ton Porter 4-wheel saddle tank; built 1912. 36" gauge.
18-ton Porter 4-wheel saddle tank, built 1910-11, 36" gauge. 3 duplicates.

REBUILT DUMP CARS

20-yard all steel Western air dump, vertical cylinders. Ten of these.
12-yard steel underframe hand dumps. Seven of these.
6-yard steel underframe hand dumps. Eight of these.

REBUILT LOCOMOTIVE CRANES

20-ton Link-Belt 8-wheel, 2-line; built 1916.
15-ton Ohio 8-wheel, 2-line; built 1919.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham Alabama

FOR SALE

SPECIALS—NEW—NEVER USED

Allis-Chalmers 6'x36' Rotary Dryer, 7/16-in. plate, now unlined, complete, at our Newark shops.

Also 54"x36' Ruggles-Coles Class F-4 Direct Heat Dryer, complete with elaborate oil burning and storage equipment.

Jaw, Gyratory, Roll Crushers—all sizes.

Kilns, Dryers, direct and indirect, all sizes.

TUBE MILLS—3'x12", 4x16; 5x20; 5x22; 5'6" x16; 5'6"x20.

HARDINGE MILLS—3'x8"; 4½x16; 5x22; 6x 22; 8x30; 8x36; 8x48.

PULVERIZERS—2-, 3-, 4-, 5-roll, high and low side Raymond Mills, also Beater types; 33" to 42" Fuller Lehigh Mills, Griffin Mills.

SWING HAMMER MILLS—All sizes—Williams, Jeffrey, Gruendler, Pennsylvania.

Send us your inquiries
Send us a list of your surplus equipment

Consolidated Products Co., Inc.
15-16-17 Park Row N. Y. C. Barclay 0603
Shops and Yards at Newark, N. J., cover 5 acres

LOCATED AT BENSON MINES, ST. LAWRENCE COUNTY, N. Y.

Below is a brief inventory of the plant. If you do not see what you want, full inventory will be mailed you.

A Lot of MOTORS Varying in Size from 25 h.p. to 200 h.p., 3 phase, 60 cycle, 440 volts.
3—300 KVA TRANSFORMERS.
1—100 KW GENERAL ELECTRIC STEAM TURBO GENERATOR SET.
1—Single Drum STEAM HOIST, Cylinder 8x12-inch. Drum 12x18-inch.
1—VULCAN, Single Drum, double cylinder STEAM HOIST, Cylinders 4x8-inch. Drum 6x15-inch.

Steel Buildings

1—45 ft. wide, 136 ft. long by 75 ft. high (4 floors).
1—76 ft. wide, 143 ft. long, 36 ft. high.
1—34½ ft. wide, 47 ft. long, 75 ft. high.
1—40 ft. wide, 126 ft. long, 30 ft. high.
1—40 ft. wide, 40 ft. long, 50 ft. high.
1—"U" Shape ALL STEEL STORAGE BIN, Capacity about 200 tons of coal.

2—No. 70 BUCYRUS STEAM SHOVELS.
2—36x36-inch GIANT CRUSHING ROLLS.
1—18x30-inch GIANT SMOOTH ROLLS.
1—18x24-inch SPIKE CRUSHING ROLLS.
2—8x6-ft. KENNEDY BALL MILLS.
2—33-Ton Standard Gauge SADDLE TANK LOCOMOTIVES.
2—304-H.P. B. & W. RUST BOILERS.
2—10-ft. MORGAN Mechanical GAS PRODUCERS.
4—DEWATERING MACHINES.
2—NEWAYGO SCREENS, Class E, No. 3.
1—CARWELL 36-inch Track Gauge BELT CONVEYOR TRIPPER.
1—ELEVATOR, 75-ft. centers. Elevator complete with tail pulley and take-up bearings with 150 "V" shape 9x12x16 steel buckets with reinforced edges, with 17-inch stitched canvas 6-ply belt.
2—ELEVATORS, 26-inch width, 60-ft. centers, 6-ply rubber belt, with 160 6x7x12-inch malleable buckets.
1—ELEVATOR, 25-ft. centers, 22-inch, 6-ply rubber belt, with 55 10x12x21-inch reinforced edge steel buckets.
325—9x12x12-inch "V" shape ELEVATOR BUCKETS.
7—42x48-inch TRUMMER SCREENS.
A LOT OF NEW SPUR GEARS AND SPROCKETS.
1—DAVIS STEAM POWER 3½-inch CORE DRILL.
1—⅝-yard ORANGE PEEL BUCKET.
1—⅞-yard ORANGE PEEL BUCKET.
7000—2½x4½x9-inch FIRE BRICK. New.
2000—KILN LINING BRICKS, 3¼x6x9-in. New.
200—Tons 60-lb. RE-LAYER RAILS with 10 sets Frogs and Switches.
4—4-yard WESTERN WHEELED DUMP CARS.
1—No. 80 STURTEVANT EXHAUST FAN.
1—No. 55 STURTEVANT EXHAUST FAN.
1—No. 36 STURTEVANT EXHAUST FAN.
1—PIPE THREADING MACHINE, 2-in. to 6-in.
1—BLACKSMITH FURNACE AND BLOWER.
1—FRANKLIN PORTABLE CRANE HOIST.
1—No. 13 NIAGARA SHEAR. Will cut iron up to ⅜ inch.

THE EQUIPMENT SALES COMPANY
Richmond, Va.

R. W. Storrs, Jr., Manager Address reply to Benson Mines, N. Y.

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED—POSITIONS VACANT
Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

MACHINERY FOR SALE

SPECIAL
One No. 6 Williams Universal Pulverizer.
One 4½'x16" Hardinge steel lined Mill.

ROTARY CRUSHERS
Three No. 00, Three No. 1, One No. 1½, One No. 2 Sturtevant Rotary Fine Crushers, One No. 0, One No. 1 Sturtevant Ring Roll Mills.

GYRATORY CRUSHERS
All sizes from No. 2 Reduction up to 12K.

JAW CRUSHERS
One 4"x8", Two 7"x10", Two 9"x15", One 6"x20", One 10"x15", One 10"x20", Two 12"x24", One 13"x30", One 15"x36", One 18"x36", One 24"x36", One 22"x50", One 36"x48", One 40"x42", One 60"x84".

CRUSHING ROLLS
One 8"x6", Two 14"x20", Two 16"x10", One 24"x12", Three 30"x10", Two 36"x16", Two 42"x16, and One 54"x24" Crushing Rolls.

DRYERS
One 3'x20', Three 4'x30', One 5'x40', Two 5½'x 40', One 6'x60', One 7'x60', and Two 8'x80' Direct Heat Rotary Dryers, One 5'x25', One 6'x30' Ruggles Coles type "A" and One 4'x 20' Ruggles Coles type "B" Double Shell Rotary Dryers, Three 6'x25' Louisville Dryers.

KILNS
One 4'x40', Two 6'x60', Two 6'x90', One 6'x 100', One 6'x120', One 7½'x80', Three 8'x 125'.

HARDINGE MILLS
One 4½', Two 6' and Two 8' Hardinge Mills.

SWING HAMMER AND TUBE MILLS
Fuller, Griffin and Raymond Mills, Screens, Air Separators, etc.

THE HEINEKEN ENGINEERING CORP.
117 Liberty St. New York City
Telephone Cortlandt 5130

New—Standard Make
1½ cu. yd. Steam and Electric
SHOVELS
At Greatly Reduced Prices

A two motor electric shovel equipped with 50 hp. hoist and swing motor, and 20 hp. crowd motor. High lift—heavy duty—factory guaranteed.

Also a new heavy duty, high lift steam shovel. Can be equipped with boom up to 32 feet in length.

Either machine recommended for severe operation requiring large output.

Terms to Meet Your Convenience

CHAS. F. COHEN
132-5 Cornell Ave. Elyria, Ohio

FOR SALE
RAYMOND HIGH SIDE MILLS

1—5-roll with Air Separator, Cyclone, Tubular Dust Collector, all 7 ft. diameter.

1—4-roll with 5 ft. Air Separator, Cyclone, Piping and etc., used only five weeks.

Get Our List of Crushing Machinery

CONSOLIDATED PRODUCTS CO., Inc.
15-16-17 Park Row, New York City
Barclay 0602
Shops and Yards on five acre tract in Newark, N. J.

FOR SALE

1—Williams No 7 Fine Pulverizer, used two months.
1—200 H.P. slip ring motor, 220 volts, 1200 R.P.M.; new.
1—50 H.P. Induction Motor, 220 volts, 900 R.P.M.
1—50 H.P. Induction Motor, 220 volts, 600 R.P.M.

Bedford Stone Products Company, Bedford, Ind.

RAILS New and Relay
ALL WEIGHTS AND SECTIONS
FROGS—SWITCHES—TIE PLATES
S. W. LINDHEIMER
38 S. Dearborn St. Chicago, Ill.

In stock 250—24" gauge 2-way Western and Austin dump cars, one and one and one-half yard capacity, in good serviceable second-hand condition. Also a number of new "V" shaped dump cars, 24" gauge: rails, new and relaying and all sorts of tracks supplies of all sections.

Park Row Bldg. New York City **M. K. FRANK** Union Trust Bldg. Pittsburgh, Pa.

FOR SALE

¾ cu. yd. American Steam Shovel. Full revolving on wheels. Ready to operate. Only $2500. Part time payments.

BROWNLEE PARK GRAVEL CO.
R. F. D. No. 1 Battle Creek, Mich.

FOR SALE

1—48 in. by 16 ft. Revolving Screen with 20 H.P., 440 volt motor back geared to same.

1—20-ton, 11x16 in. American Saddle Tank Locomotive No. 42405.

E. T. WALKER Centerville, Ohio

32 ton, American, 32-in. wheel centers, 175 lbs. pressure, air and steam brakes; completely overhauled.

75 ton, 21x26-in., 6-wheel switcher, piston valve, Walschaert valve gear, superheated; built Dec., 1922.
50 ton, saddle tank, new boiler, new cylinders, new tank, new tires.
17—16-yd. Western dump cars, rebuilt; new bodies, steel lined floors.
10—20-yd. Western dump cars, all steel, vertical air cylinders.

HAVE FORTY LOCOMOTIVES, OVERHAULED AND READY, 5 TO 100 TONS, CARS, SHOVELS, CRANES, RAIL, ETC.

ALSO
LOCOMOTIVE SPRINGS, MANUFACTURED AT OUR WORKS HERE

SOUTHERN IRON & EQUIPMENT COMPANY
(Est. 1889)
ATLANTA - - - - - GEORGIA

CLASSIFIED ADVERTISEMENTS

USED EQUIPMENT

Crushers No. 12, 10, 9, 8, 7, 6, 5, 4
Roll Crushers
84x72, 36x60, 72x30, 18x30
60x84—Jaw Crushers—16x60
36x48—40x42—26x50—24x36—20x34—60x84
12x37—18x36—13x30—7x24—7x16—10x22
2—30 and 37 Kennedy Gearless Crushers.
DISC CRUSHERS, 48", 36", 24", 18"
3 Oil Engines 200 H. P., New
¾—1 AND 1¼—2½-YD. CAT SHOVELS
5 Ton Crane 70' Span A C Motors
AIR COMP.—HOISTS—KILNS
DRAG LINES—LOCO. CRANES—MOTORS
Other BARGAINS—(Send us your inquiries)
Ross Power Equipment Co.
13 South Meridian St. Indianapolis, Ind.

FOR SALE

1—18-B Bucyrus Shovel, caterpillar tread, steam equipped with special boom for loading into railroad equipment. Recently overhauled and in good mechanical condition.

1—38-ton standard saddle tank locomotive.

1—carload of 80 lb. rails.

1—double drum contractor's steam hoist and miscellaneous dragline equipment, consisting of ropes, buckets, carriers, rope blocks and other equipment.

Any reasonable offer accepted for any of the above equipment. Material located within 30 miles of Des Moines, Iowa.

KANSAS AND IOWA COAL COMPANY
1219 Southern Surety Building
Des Moines, Iowa

GASOLINE SHOVELS

1—KOEHRING, Caterpillar, new 1926, 1-yd., HIGH LIFT, overhauled, like new.

1—OSGOOD HEAVY DUTY (1-yd.) Caterpillar, new 1927, 1-yd. dipper; HIGH LIFT; also 40 ft. crane boom if desired, like new.

STEAM SHOVELS

1—ERIE B-2 DREADNAUGHT, Caterpillar, new 1927, 1-yd., HIGH LIFT, perfect condition.

1—30-B BUCYRUS, Caterpillar, new 1926, 1⅛-yd. dipper; boom 22 ft., dipper handle 16 ft.; first class condition.

GREY STEEL PRODUCTS COMPANY
111 Broadway New York, N. Y.

Zelnicker's Bulletin
Lists bargains in Rails, Equipment, Oil Engines, Tanks, Pipe.
Get your copy now
ZELNICKER IN ST. LOUIS

USED EQUIPMENT WANTED

WANTED

Would like to have Steam Shovel for quarry work. Must be heavy shovel, oil or coal, 1½ yd. bucket. Must be in first class condition. Age of shovel, price and pictures. Delivery at Carter, Kentucky. Address

ASHLAND LIME STONE COMPANY
418 Dist. Nat. Bank Bldg. Washington, D. C.

BUSINESS OPPORTUNITIES

For Sale
COMPLETE COMMERCIAL DUNTILE PLANT
In first class condition. Located New York. Ready to operate. Must be sold immediately at a real bargain. Don't answer unless you mean business.

Oolitic Stone Art Works
Bloomington, Indiana

GYPSUM
Mining, Quarrying, Processing, Construction, and Research
The undersigned is available for consultation and service to the Gypsum Products Industry in connection with all problems relating to the production and use of gypsum plaster, stucco, wallboard, tile, etc. I have facilities for testing and research work, and a background of successful experience as a chemist and superintendent of gypsum plants.
Walter B. Lenhart
265 Quincy Ave., Long Beach, Cal.

FOR SALE
Two deposits of limestone in northwest Florida—both large tonnage and high grade. Railroad runs through one and no great distance from other. Should interest cement manufacturers. Address
S. D. CRENSHAW
P. O. Box 667 Richmond, Va.

FOR QUICK SALE AT SACRIFICE
A 300-ton stone crushing plant complete in every detail; running now, with contracts for this season. Location Eastern Indiana.
Address inquiries to
THE WABASH STONE COMPANY
Geneva, Indiana

POSITIONS WANTED

SUPERINTENDENT, WITH LONG EXPERIence in the crushed stone and gravel industry, desires change. Familiar with heavy and efficient operation steam or electric, drilling, blasting, milling. Location anywhere. Excellent references. Address Box 152, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

QUARRY SUPERINTENDENT—CAPABLE of handling all machinery or build plants. Am also millwright and have had twenty years experience in cement business and four years in the mining of rock under state inspection. Address Box 151, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

DRAFTSMAN—EIGHT YEARS EXPERIence-plant maintenance, layout and construction work in Cement and Rayon Mills, wants position with opportunity for advancement. P. C. Jerue, care Hummel Ross Fibre Corporation, Hopewell, Va.

POSITIONS WANTED

ENGINEER, EXPERIENCED IN DESIGN, construction and operation; cement, lime, crushing, pulverizing, conveying, ore handling and treating plants. Considerable experience in other industrial manufacturing lines. Address Box 2253, care of Rock Products, 542 South Dearborn St., Chicago, Ill.

SUPERINTENDENT—15 YEARS EXPERIence in charge of limestone mines, quarries and lime burning plants. Executive ability and experienced in plant design and construction, mine and quarry development. Address Box 112, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

POSITION WANTED—CEMENT PLANT superintendent or large quarry operations. Have thorough knowledge of cement plant machinery and also large quarry operations. Am at present employed. Desire change on account climate. South or west preferred. Give best of references. Address Box 154, care of Rock Products, 542 S. Dearborn St., Chicago, Ill.

ENGINEER AND MANAGER, OR SUPERINtendent, age 40, married, 12 years experience in sand and gravel business as engineer and manager. A hustler. Can handle men, sell, maintain all classes of equipment, do all my own engineering and can get results by efficient, economical management. Will go anywhere, and am now available. Address Box 155, care of Rock Products, 542 S. Dearborn St., Chicago, Ill.

POSITIONS VACANT

OPERATOR—EXPERIENCED ON MARION Electric, with Ward-Leonard control. Apply Foley Brothers, Inc., 117 Liberty Street, New York City.

To Employers Who Advertise for Men:

These advertisements of "positions vacant" and "positions wanted" are all bona fide, and in a large majority of cases from firms and men known personally to one or more of the staff of Rock Products.

It sometimes happens, when an employer receives a number of applications for a position open, he neglects to acknowledge some of them.

As a matter of courtesy and good will in our relatively small and closely knit industries, the applicant should receive some acknowledgement. If the employer does not wish to disclose his identity he may make the acknowledgement on plain letter paper.

The applicant is, in practically every instance, a bona fide operating man in the rock products industry. Otherwise he would never see a copy of Rock Products, as it has no circulation outside of those definitely interested in the production of these commodities.

Unless the applicant receives some acknowledgement he does not know that his application forwarded through Rock Products has been properly taken care of or not; and a very good candidate for some future employment is discouraged from answering these blind advertisements, to the detriment of both employer and employe.

Therefore, for the good of all our industry, employers and employes, please treat such applications with the same courtesy you would any other business communication.

—The Publishers.

INDEX TO ADVERTISEMENTS